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ANNUAL REVIEW

CIRCULATES IN EVERY PROVINCE OF CANADA AND ABROAD

MARINE ENGINEERING of Canada

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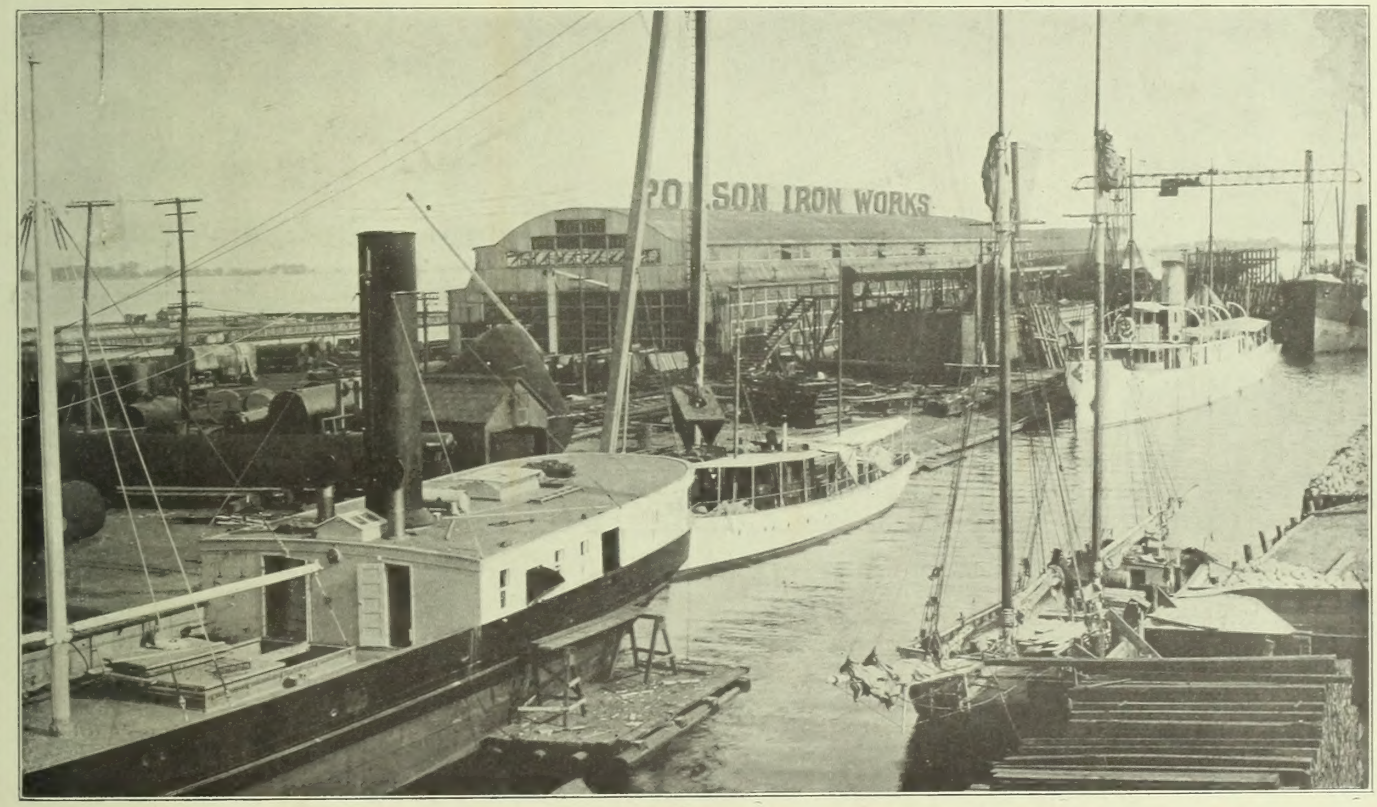
A monthly journal dealing with the progress and development of Merchant and Naval Marine Engineering, Shipbuilding, the building of Harbors and Docks, and containing a record of the latest and best practice throughout the Sea-going World. Published by The MacLean Publishing Co., Limited

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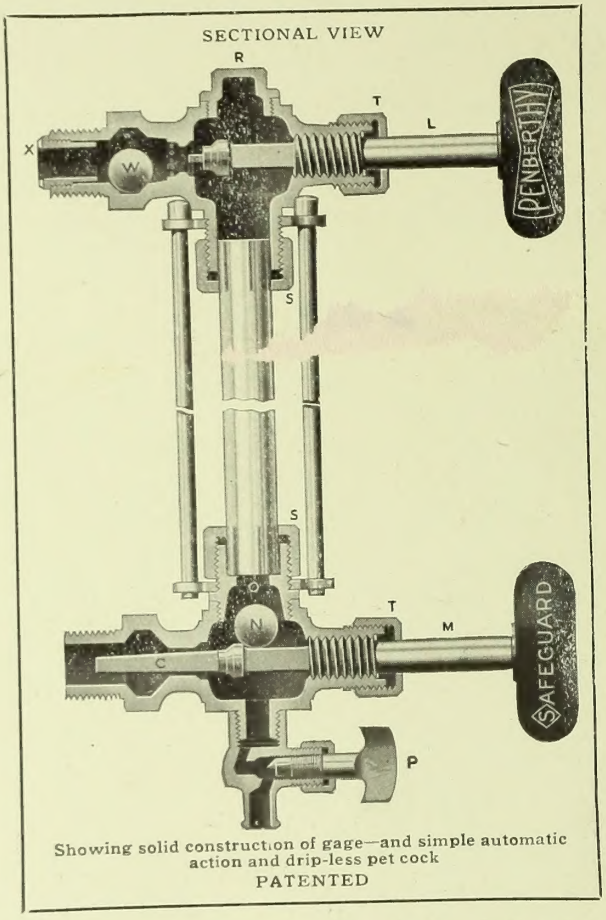
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Annual Review Number

The January issue contains a comprehensive statement of the world's shipbuilding and marine engineering output for 1911, as also a series of articles dealing with the developments taking place and the progress made in the design, equipment and propulsion of naval, merchant and pleasure craft. The number is a valuable one for instruction and reference purposes, and should be in the hands of every man engaged in marine pursuits.

MARINE ENGINEERING OF CANADA
143 UNIVERSITY AVE., TORONTO

Date.....1912

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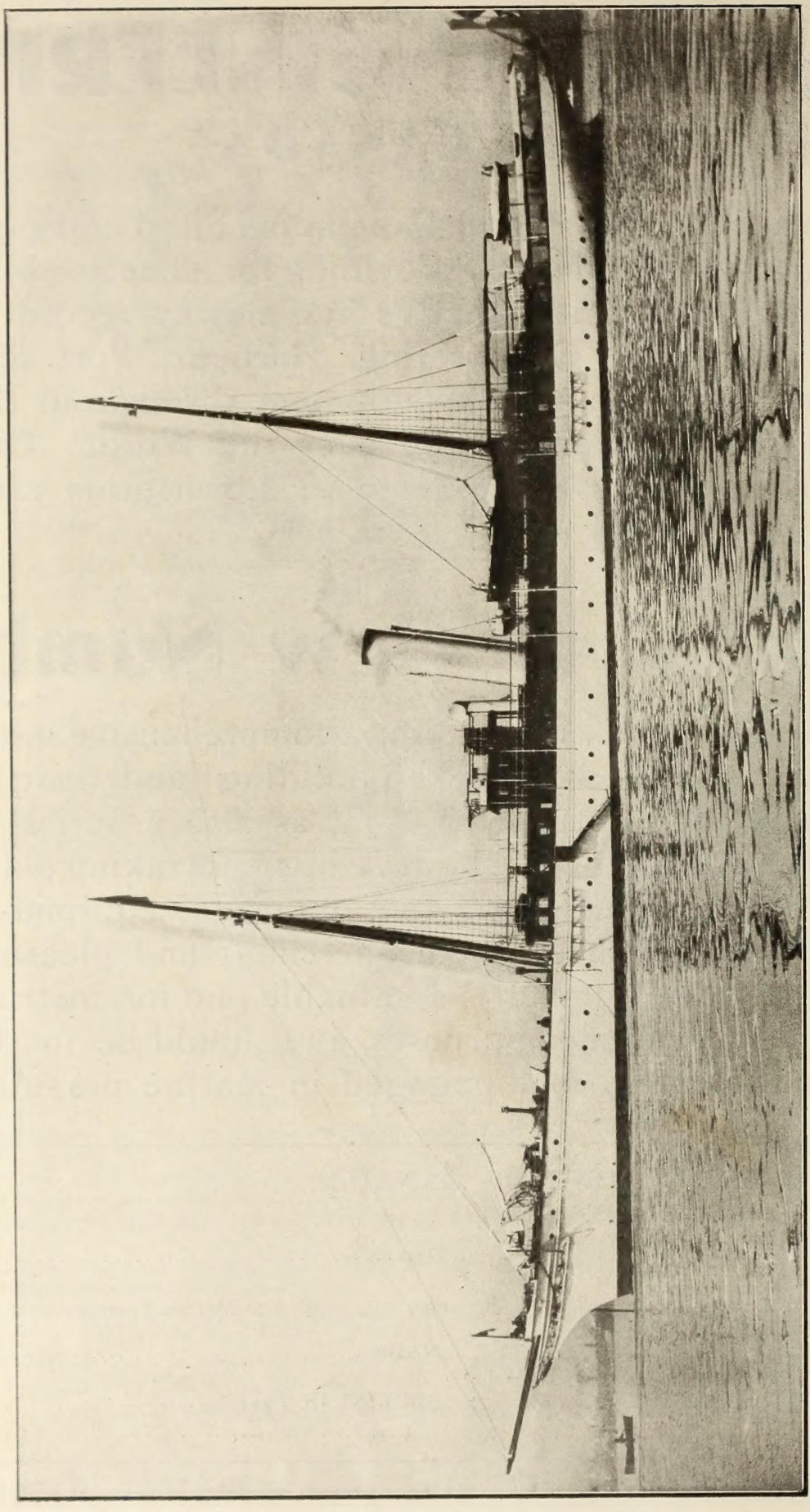
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The Steam Yacht "Catania," whose sojourn in Toronto Bay for a considerable period last Fall aroused much favorable comment and criticism of her graceful lines and general appearance. Her owner, the Duke of Sutherland, was a visitor to Canada during the vessel's stay.

Shipbuilding and Marine Engineering Returns for 1911

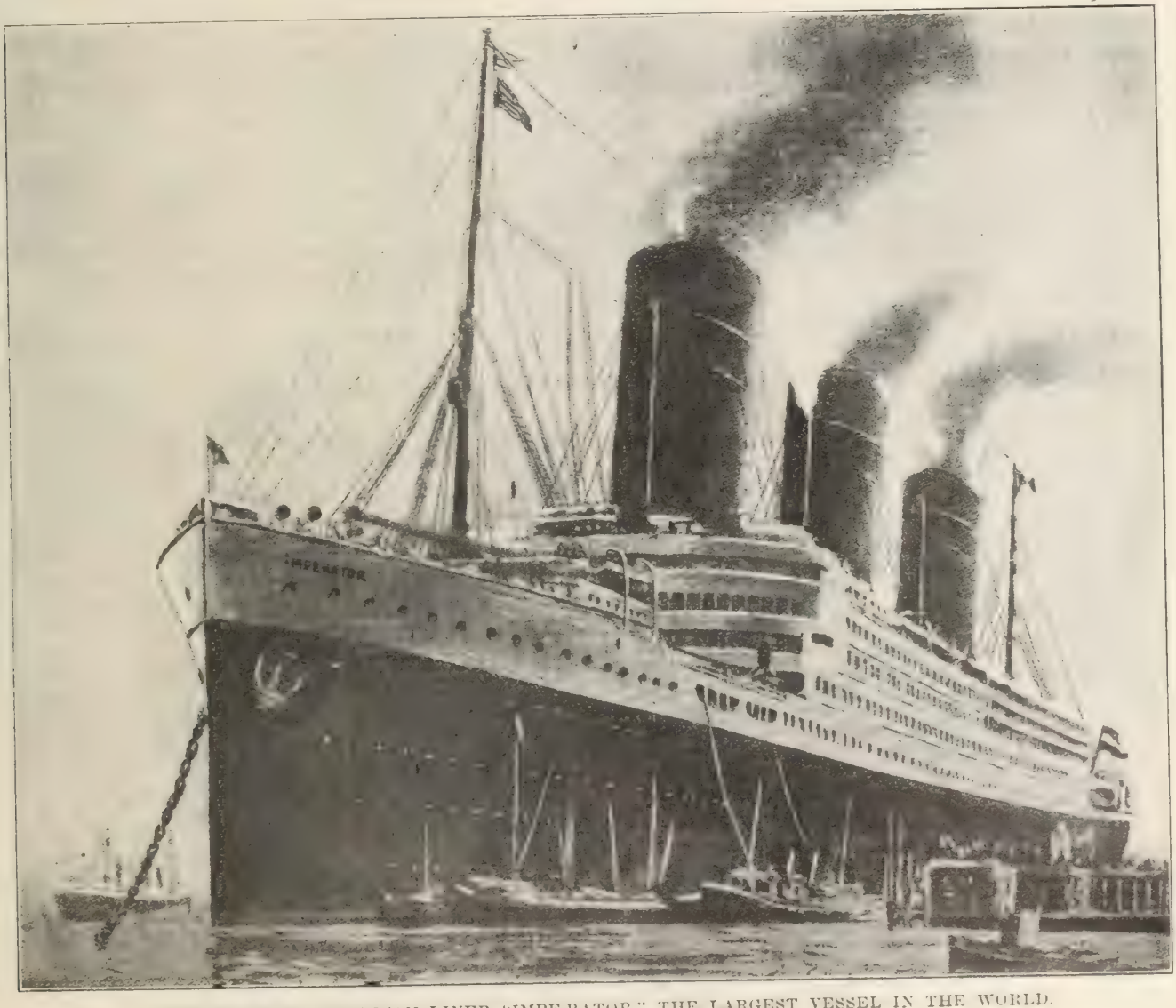
The extraordinary development and progress in the world's shipbuilding and marine engineering during the past year is of more than passing interest to Canadians in view of the projected establishment of plants and drydocks for this particular purpose at various locations on their Atlantic and Pacific coasts. The question naturally arises: Does our Dominion, through its government and public opinion, realize the fact that the present highly subordinate position occupied by us in relation to this important industry, is a matter calling for immediate attention and action?

THE shipbuilding and marine engineering industries have just passed through what has been the most remarkable year since the construction of ships began to take a leading place in the trade of the world. Expressed in figures only, the results of the work of the twelve months speak eloquently of a period of extraordinary activity in almost all the shipbuilding countries—the United States alone excepted. It is true, of course, that there are now more firms building ships than there were in those days not so long ago, when half the 1911 tonnage would have been considered a splendid record of work done, and also that everywhere there has been speeding up in production, improvement in plant and organization, standardization of designs and of parts, and an enormous increase in the ability to turn out new tonnage.

Absorbing Power of World's Shipping.

These things, however, do not account for the advance which has to be placed to the credit of 1911. This advance can only be accounted for by the steady demand for new ships, and it says a great deal for the absorbing power of the world's shipping, and of its naval requirements, that the launching in one year of 3,199 vessels aggregating 3,568,076 tons, and requiring engines of 4,113,469 indicated horse-power for their propulsion, is justified by current trade conditions. The figures are astounding, but they represent the working of the economic law of supply and demand just as did the poor output of 1908.

The principal summaries of the work done are eloquent, however, in another way. They show once more the preponderance of British shipbuilding, the growing importance of that of Germany, and the great economic handicaps which prevent that of the United States from expanding as do other countries with, if



THE HAMBURG-AMERICAN LINER "IMPERATOR," THE LARGEST VESSEL IN THE WORLD.

anything, fewer natural advantages. The work of British and foreign shipyards will be found summarised under their respective headings, but here there may be given the table which shows in the smallest possible space the tonnage of the United Kingdom, British Overseas Dominions, and other countries:—

SUMMARY OF WORLD'S SHIPBUILDING.

	1911.			1910.		
	Ves.	Tons.	I.H.P.	Ves.	Tons.	I.H.P.
[illegible]	897	1,221,948	1,139,527	692	752,136	861,034
[illegible]	557	671,624	837,668	450	420,250	624,268
[illegible]	24	186,825	150,116	21	167,102	137,730
U. K. Totals	1,478	2,080,397	2,127,311	1,163	1,339,488	1,623,032
[illegible]	152	29,249	12,875	142	24,077	10,237
[illegible]	1,569	1,453,430	1,973,283	1,324	1,001,690	1,146,457
Grand total	3,199	3,563,076	4,113,469	2,629	2,365,255	2,779,726

It may be noted that there is an increase all over of 570 vessels, 1,202,821 tons, and 1,333,743 i.h.p. Of this increase, no fewer than 315 vessels of 740,709 tons and 504,229 i.h.p. are to the credit of the United Kingdom; while the advance in all foreign countries is represented by only 245 vessels of 456,740 tons and 826,826 i.h.p. Of this, by far the largest proportion is to be found in the German returns, while in the United States there was a very marked decrease. It is quite evident that in the matter of shipbuilding, Great Britain has far more to fear from Germany than from any other possible competitor. There, not only are all classes of cargo steamers being built, but the leading firms are specialising in the finest and largest types of ocean liners quite as much as any of those builders on the Clyde or Tyne, and in quality of workmanship there is nothing to choose between the productions of the two countries.

Leading Districts.

In all comparisons showing the work of the principal shipbuilding "districts" of the world during the year, the predominance of the Clyde is obvious. In 1911 it produced a larger tonnage than any country apart from the United Kingdom. Its total is not far short of those of Germany and the United States combined, while it is only 73,000 tons short of that of the Tyne and Wear combined and is 65,000 tons higher than those of the Wear and Tees combined. In this table the figures for the United Kingdom are given, as well as those for its leading districts, so that they may be seen in association with those of Germany and the United States.

	Vessels.	Tons.	I.H.P.
[illegible]	1,477	2,080,397	2,127,311
[illegible]	445	650,583	789,929
[illegible]	125	417,175	421,060
[illegible]	220	161,881	696,785
[illegible]	86	286,854	193,343
[illegible]	134	279,245	169,610
[illegible]	160	268,561	257,825

Leading Shipbuilders.

It was evident for some months before the end of the year that there was to be a close race between Messrs. Harland and Wolff, of Belfast, and Messrs. Swan, Hunter and Wigham Richardson, of Wallsend-on-Tyne, for first place in the matter of tonnage. Each had a huge output to their credit, but so close were the estimates that until the official figures were available it was impossible to say which would take the lead. In the end, however, it was seen that the honor had again gone to the great firm on the Lagan, who previously had the largest output per individual firm for one twelve months on no fewer than twelve occasions. This is a wonderful record and one of which the North of Ireland may be justifiably proud. The building of so many huge steamers, to the almost absolute exclusion of small vessels, accounts of course for the unique position to which the firm have attained. They have only 10 vessels in their 1911 output, while the almost equivalent tonnage of Messrs. Swan, Hunter and Wigham Richardson is spread over 24 vessels—2 of them floating docks. In the work of the other four firms, in the first half-dozen for the year, there are no points of special interest:—

	Vessels	Tons.
Harland and Wolff	10	118,209
Swan, Hunter & Wingham Richardson	24	109,861
William Doxford and Sons	17	80,400
Sir W. G. Armstrong, Whitworth and Co.	13	74,124
William Gray and Co.	18	73,588
Russell and Company	14	72,230

The Question of Tonnage.

In connection with this matter it may be well to refer once more, as we have done on several previous occasions, to the question of tonnage measurement. When the difference between the two leading firms is only a matter of 8,000 tons odd, it is necessary to point out that in each case the figures given are Board of Trade tons gross, the official measurement of the United Kingdom. This measurement rules all through our returns—for merchant tonnage—and the word "tons" means, in every case where not otherwise stated, Board of Trade gross tons for merchant vessels and displacement for war vessels. It is now much too late in the day to make comparisons of any kind based on tonnages which are not uniform and official, but the difficulty of dealing with such structures as floating docks has yet to be overcome. In the case of the Belfast firm there was no difficulty of this kind, but in that of Wallsend there were two floating docks. These figure in the returns as "lifting tonnage," and in the somewhat peculiar circumstances, whatever slight inaccuracy this may give rise to, may be excused, especially as it does not bring the total tonnage up to the level of that of Queen's Island.

The following are the firms which have had the largest tonnages in the world since 1890:—

Year.	Company.	Tons.
1911.....	Harland & Wolff	118,209
1910.....	Harland & Wolff	115,861
1909.....	Workman, Clark & Co.	88,952
1908.....	Harland & Wolff	106,528
1907.....	American Company (7 yds)	191,602
	Wm. Doxford & Sons	91,254
1906.....	American Co. (6 yds.).....	198,535
	Swan, Hunter & Wingham Richardson	117,943
1905.....	American Co. (7 yds.).....	136,793
	W. Doxford & Sons	86,632
1904.....	Russell & Co.	73,689
1903.....	American Co. (7 yds.)	166,288
	Harland & Wolff	110,463
1902.....	American Co. (7 yds.)	132,197
	Harland & Wolff	79,497
1901.....	Harland & Wolff	92,310
1900.....	William Gray & Co.	74,191
1899.....	Harland & Wolff	82,634
1898.....	William Gray & Co.	72,323
1897.....	Harland & Wolff	82,240
1896.....	Harland & Wolff	81,310
1895.....	William Gray & Co.	66,086
1894.....	Harland and Wolff	65,448
1893.....	Harland & Wolff	65,660
1892.....	Harland & Wolff	68,612
1891.....	Harland & Wolff	64,962
1890.....	Russell & Co.	70,370

Leading Engineers.

First place among marine engineers falls to the Vulcan Co., of Stettin, with a total of 166,250 i.h.p., composed almost wholly of warship work for the German Government and the turbines for a Russian destroyer. Messrs. Hawthorn, Leslie & Co., who are second, made warship engines only. Messrs. Vickers, Sons & Maxim engined only one small vessel apart from warships. The Birkenhead firm of Cammell, Laird & Co., indicated horse power, is almost wholly that of destroyers, and in that of John Brown & Co., Clydebank, there are the engines of a battleship cruiser and two destroyers. The North-Eastern Marine Co.'s figures, of course, all refer to merchant work:—

	I.H.P.
The Vulcan Company	166,250
Hawthorn, Leslie & Co.....	132,200
Vickers, Sons & Maxim	121,000
Cammell, Laird & Co.	118,987
John Brown & Co.	104,550
North-Eastern Marine Co. (2 shops)..	98,105

The Largest Vessels.

The Titanic—sister ship to the Olympic of last year—is easily the largest vessel launched in 1911. As in the case

of the highest tonnage, the Wallsend yard follows that of Queen's Island, but in this case at a greater distance—the Laconia being less than half the tonnage of the Titanic. Messrs. Harland & Wolff had four vessels in the first six of 1910, and they have two in that of 1911, while the now famous Mitsu Bishi Works of Nagasaki and Kobe figure in the list for the first time :—

Vessel.	Type.	Tons.	Builder of Vessel.
Titanic	3 scr.	46,000	Harland & Wolff
Laconia	T. s.	18,150	Swan, Hunter & W. Rehrdsn
Arlanza	3 scr.	15,000	Harland & Wolff
Cap Finisterre	T. s.	14,500	Blohm & Voss
Shinyo Maru	Turbine	13,377	The Mitsu Bishi Works
Orama	3 scr.	12,927	John Brown & Co.

Of the half-dozen, only two have machinery of the ordinary reciprocating twin-screw type. These—the Laconia and the Cap Finisterre—are splendid examples of British and German workmanship, but the fact that the other four have newer types of engines is very significant. The world's largest vessels, the Titanic and the Olympic, have the Parsons "combination" system of three-screw propulsion, and so has the large Clydebank-built Orient liner, Orama, while the large Japanese steamer has Parsons turbines. Closely following the Orama in size come quite a number of other vessels—the fine French "combination" liner Rochambeau, the Austrian liner Kaiser Franz Josef I., the French liner Paul Lecat, the "Royal Durbar" P. and O. liner Medina, and others. All are notable ships—in design, construction, machinery, and equipment.

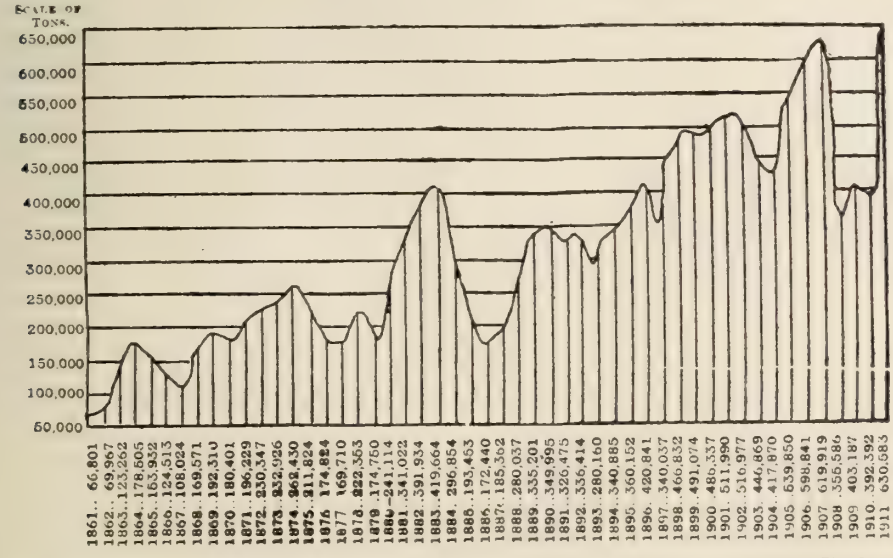
Scottish Shipyards.

Where shipbuilding is concerned, the Clyde dominates all Scotland to such an extent that any fluctuations in trade on the East Coast are quite lost by being swallowed up in the figures relating to the great Western river, and it is difficult to comment in any way on Scottish shipbuilding in general and give the East Coast firms their due share of notice. In 1910, for instance, although there have been quite satisfactory improvements in trade on the Forth and the Tay, the increased tonnages in these districts are infinitesimal when placed alongside the very large increase on the Clyde. Over the whole country the new work launched consisted of 557 vessels of 671,624 tons and 837,688 i.h.p. This represents a gain of 207 vessels, 251,374 tons, and 213,400 i.h.p. Of these figures 52 vessels, 13,183 tons, and 17,311 i.h.p. represent the increase on East Coast tonnage. This increase is very satisfactory indeed when the total for these districts is remembered, but it does not apply to the output of the Aberdeen yards, which is about the same as that of 1910. Altogether trade has been and still is quite satisfactory in all the Scottish districts :—

	1911.			1910.		
	Ves.	Tons.	I.H.P.	Ves.	Tons.	I.H.P.
The Clyde	413	630,583	789,920	358	392,392	593,840
The Forth	31	11,319	9,355	17	9,385	5,935
The Tay	31	17,303	14,770	15	5,982	7,800
Dee and Moray Firth	82.	12,419	23,614	60	12,491	16,693
	557	671,624	837,668	450	420,250	624,268

The Clyde.

There has never been a year in all the long and intensely interesting history of the Clyde as a shipbuilding centre, in which there was so much room for comment on the work done as there is in the output of new ships and machinery during the year 1911. In the first place, all the figures set up new records. This might have been a small matter in itself, as the advance on the figures of 1907 is not very great, but when the circumstances which have intervened since the previous record year are remembered, and also the condition of trade existing at the close of the year 1911, the fact that a larger tonnage of new shipping was launched, and a larger horse-power of new machinery constructed, is of peculiar importance. The work of the year represents not only the high-water mark of Clyde ship-building, but also the extent of the recovery from the depression which followed the unwarranted expansion of four years ago. At the close of 1907, while there was, naturally, satisfaction over the turning out of so much new work, there was also a note of misgiving in all references to trade prospects, and everyone interested in the industry knew that there could not be immediately afterwards another year of so much work. This year, while it is never safe to prophesy before the event, especially in industrial matters, the outlook is very much better. The shipyards have done their best year's work, they are still busy, they have contracts which will ensure them continued employment well down through 1912, and there is no deadweight of unemployed tonnage hanging over the freight markets as there was a few years ago.



This diagram shows the fluctuations of Clyde shipbuilding tonnage since 1861. It shows very clearly the great decline of 1908, the improvement in 1909, the slight decrease in 1910, and the great increase in 1911.

English Shipyards.

The prosperity of English shipbuilding is well reflected in the figures from the different districts. A total of 897 vessels, representing 1,221,948 tons and 1,139,527 indicated horse-power, as compared with 692 vessels of 752,136 tons and 861,034 i.h.p. in 1910, shows a margin to the good of 205 vessels, 469,812 tons, and 278,493 i.h.p.—in itself a fair production for any one large district. The bulk of the increase is seen of course in the figures from the North-East Coast, which are the highest ever recorded. The activity in the yards in that district has been abnormal, and there are advances on the Tyne, Wear, and Tees of 180,487 tons, 113,161 tons, and 91,940 tons respectively. Even after all this enormous production, the three rivers remain fully employed, and there is no sign of any falling off in the demand for the type of large cargo carriers, which accounts for the greater

part of their 1911 output. There were various developments of interest on the North-East Coast during the year. The Palmer Co., of Jarrow, took over and launched several vessels from Messrs. Stephenson's yard at Hebburn, which was idle all through 1910. This yard is now fully employed, and so is the dry dock boiler shop and foundry, which also passed into the hands of the Jarrow firm. Several schemes of shipyard extension are being considered by North-East Coast firms, and in some cases the necessary land has been acquired. It is expected that by and by, when the large Elswick concern, compelled by the increasing size of warships to move to their new naval works at Walker, vacate their present works these will be used exclusively for the building of merchant ships or for extensions of their steel and ordnance departments. In other English districts, too, shipbuilders and engineers are taking advantage of the prospects of continued employment to improve their establishments, and the work turned out not only measures more in tonnage than in most previous years but is more highly specialized and of higher average quality. The only decreases in output are those shown in the English Channel and Bristol Channel districts. In one case, however, the yards do work of a type for which the demand does not rise and fall in accordance with that for general tonnage, and in the other, ship repairing and overhauling is more the work of the firm than shipbuilding

	1911.			1910.		
	Ves.	Tons.	I.H.P.	Ves.	Tons.	I.H.P.
The Tyne	125	417,175	421,060	81	236,688	272,991
The Wear	86	286,834	193,343	58	173,673	124,205
Tees & Hartlepools	134	279,245	160,640	86	187,305	115,975
Mersey to Solway	128	84,085	144,449	95	41,835	144,804
The Humber	117	44,966	55,770	77	28,033	42,710
The Thames	167	38,504	72,751	142	11,532	30,680
English Channel	97	8,829	90,974	93	11,373	128,969
Bristol Channel	36	3,050	540	56	9,176	700
Royal Dockyards	7	59,260	....	4	52,521	....
	897	1,221,948	1,139,527	692	752,136	861,034

Irish Shipyards.

It is no new thing for Belfast to carry off the honors in shipbuilding. It has done so very often—so often, indeed, that the public are now in the habit of looking instinctively to the Laggan for the highest tonnage of each year. This time, however, the record of the big Queen's Island firm is even more noteworthy than usual. It is the largest output in the world for the year 1911, but it is also the largest for any single firm for one year. The nearest approach to the figures was that made by Messrs. Swan, Hunter and Wigham Richardson, of Wallsend-on-Tyne, in 1906, when they launched the Mauretania and had a total output of 112,830 tons. Messrs. Harland & Wolff's work during 1911 consisted of 10 vessels of 118,209 tons and 96,916 i.h.p. Messrs. Workman, Clark & Co. also launched 10 vessels, but the average size was only something more than half that of the vessels of the other yard. Altogether the total for Ireland—which is practically Belfast so far as shipbuilding is concerned—consists of 24 vessels of 186,825 tons and 150,116 i.h.p., as compared with 21 vessels of 167,102 tons and 137,730 i.h.p. in 1910. Of new work there is a large tonnage on hand. The orders at Queen's Island include a Holland-Amerika liner of 32,500 tons, an 18,000-ton White Star (for the Australian service), three steamers for the Royal Mail Steam Packet Company, a Bibby liner about 560 feet in length, an Elder Dempster liner of about 550 feet, a vessel for the African Steamship Company, and others regarding which no official announcement has yet been made. At Messrs. Workman, Clark & Co.'s yard, too, most of the berths are likely to be occupied all through the year:—

	1911.			1910.	
	Ves.	Tons.	I.H.P.	Tons.	I.H.P.
Harland & Wolff	10	118,309	96,916	115,861	100,130
Workman, Clark & Co.	10	66,399	51,800	49,993	36,300
The Dublin Dockyard Co.	2	1,976	....	1,078	....
Larne Shipbuilding Co.	2	241	....	170	....
MacColl & Co.	..	....	1,400	....	1,300
	24	186,825	150,116	167,102	137,730

British Dockyards.

The output of the British Naval Establishments was seven vessels of 59,260 tons displacement. In 1910 it was four vessels of 52,521 tons, in 1909 six sessels of 46,612 tons, and in 1908 five vessels of 43,060 tons. The details are summarized in the appended table:—

Vessel.	Type.	Tons.	Built at.
King George V	Battleship	23,300	Portsmouth
Centurion	Battleship	23,300	Devonport
Active	Scout cruiser	3,380	Pembroke
Amphion	Scout cruiser	3,380	Pembroke
Chatham	Prot. cruiser	4,800	Chatham
D 7	Submarine	550	Chatham
D 8	Submarine	550	Chatham
		59,260	

The propelling machinery for all these vessels was constructed by contract. Sheerness does not now build new craft, and neither Pembroke nor Chatham has produced on armored ship since 1907. All five yards, however, as well as Malta, Gibraltar and Houlbowline, do much valuable repair and overhaul work

Early in 1912, another battleship will be laid down at Portsmouth. One will also be begun at Devonport. A scout cruiser of the Boadicea type is on the stocks at Pembroke. The Orion is at Portsmouth completing, and the King George V. is fitting out there. At Devonport, the Lion is completing and the Centurion fitting out. The Chatham is fitting out at Chatham, two submarines of the E class are on the stocks, and one of the D class is fitting out.

British Colonies.

The work of the shipyards and engine shops in British Overseas Dominions is necessarily of a restricted and frequently of a purely local character, but the reports of tonnage launched are becoming more and more interesting. The feature of the work for several years has been the inclusion of new names. First we had the two Bengal firms, Messrs. Burn & Co. and Messrs. King & Co., both of whom build a good many launches, yachts and small steamers, and also reconstruct light draught vessels shipped from the United Kingdom. This year we have two additional returns—from the Taikoo Dockyard, Hong Kong, and the Shalimar Works, Bengal—in each case with a fair number of small craft to their credit. Generally speaking, of course, the largest vessels are built in the Dominion of Canada. The steamer Emperor, which was launched in 1910 at Collingwood for the Inland Lines Navigation Co., but is included in this year's returns, has a carrying capacity of 10,000 tons and measures 7,031 tons gross. After the Emperor, the largest vessels are two from the same yard, and one from Hong Kong; all over 1,000 tons gross. It is hoped that the construction of the smaller vessels of the Commonwealth Fleet Unit in Australian yards will give shipbuilding in that island continent a real start, but it is yet too soon to say whether the naval policy will have any permanent effect on mercantile work or whether the economic conditions are such as will ensure the establishment of the industry on a sound basis The question of labor is of more importance in Australia than in most countries, because of the strength of the trade unions, politically and otherwise, and that of supplies of material has yet to be faced. In Canada, the dropping of the Laurier policy of naval shipbuilding puts an end,

for the present at all events, to the schemes for establishment of shipyards on the Atlantic and the Pacific seaboards and without Government assistance mercantile work cannot be done in open competition with British firms. Among work on the stocks, there may be mentioned a lighthouse tender at Collingwood for Government service on the Pacific Coast, several steamers of small size at the same yard, about 3,000 tons of barges and river steamers at Messrs. Burn & Co.'s yard, Bengal, India, four ferry steamers and a lighter at Balmain (N.S.W.), eleven small vessels at Singapore, and a steamer of 700 tons at the Taikoo Dockyard:—

were issued during the year did not indicate that profits to any appreciable extent were being made, there has really been quite remarkable activity in the great majority of the yards, and the result is an output for the year which is easily the highest for any country apart from the United Kingdom. An increase from 217,000 tons to 400,000 is sufficient proof that a great deal of work has been done, but, as in Great Britain, it does not follow that large turnover has meant large profits. The last declared dividends of the companies ranged from nil in the case of several firms of very high standing to 14 per cent in the case of others. The fact remains, however, that there has been, and still is, a very large amount of work on hand, both naval and mercantile. The large Hamburg-American liner Imperator is returned by the Vulcan Company of Stettin as of 52,000 tons gross. It is persistently rumored that another and probably still larger vessel is to be laid down at their yard for the same owners, but nothing official has been said about this, or, for that matter, about the exact dimensions of the Imperator as compared with the Cunard liner Aquitania. Several large oil-engined ships are being built in Germany, notably three twin-screw vessels ranging from 8,000 to 15,000 tons carrying capacity, which are under construction at Kiel for the German American Petroleum Company.

	1911.			1910.	
	Ves.	Tons.	I.H.P.	Tons.	I.H..P
Collingwood Shipbuilding Co.	4	10,485	4,950	203	1,000
Burn & Co.	42	6,558	710	7,803	....
John King & Co.	22	2,384	940	2,930	230
The Taikoo Dockyard	3	1,916	3,120	....	....
Taujong Pagar Dock Board	22	1,187	1,350	1,417	55
Riley, Hargreaves & Co.	11	398	473	230	258
The Shalimar Works	8	337	85	....	....
W. S. Bailey & Co.	11	290	307	....	....
Other firms	29	5,097	....	10,894	6,614
Mort's Dock Co.	..	....	940	600	2,080
	152	29,249	12,875	24,077	10,237

Foreign Shipyards.

We have reports from practically every foreign shipyard and engineering works of any importance, from the other side of the Straits of Dover, all round the European coasts, through the Mediterranean, out to the Far East, and from both the American seaboards. There has never been a more complete record of the shipbuilding and engineering work of countries outside of Great Britain than is given in the following detailed returns. The record of Japan in the matter of shipbuilding is quite as wonderful as any of its other achievements.

Among all the foreign countries, the work of Germany calls most loudly for notice. Our figures show an increase all over the non-British world of 245 vessels, 456,740 tons, and 826,826 i.h.p. Of this the comparatively small number of 20 vessels, the respectable tonnage of 184,133, and the still more notable i.h.p. of 350,693 stands to the credit of Germany. The average size of the vessels built, it is evident, must have been considerably greater than it was in 1910. The United States lost ground considerably. France almost doubled its 1910 figures, Holland shows a satisfactory increase, and so do all the other countries, with the exception of Belgium and China. In a year of unexampled prosperity, America is the only country in which shipbuilding has failed to make progress.

Germany.

Although some of the reports of the German shipbuilding companies which

France.

The year has been interesting in France from the points of view of both naval and mercantile shipbuilding. Two battleships, nine destroyers, three gunboats, two submersibles, and a destroyer dock make a very good list of naval work, even though it is not all for the home Government. The steamer Rochambeau, built at St. Nazaire for the Havre-New York service of the Cie. Generale Transatlantique, has "combination" reciprocating and turbine machinery. She is the largest merchant ship in the French returns, and is designed for a speed of 17 knots. In the matter of size she is followed closely by the Paul Lecat, built at La Ciotat for the mail service of the Messageries Maritimes to the Far East, and the twin-screw steamer Valdivia, built at Port de Bouc for the Cie. Transport Maritime of Marseilles. Another vessel of exceptional interest is the auxiliary barque France, a ship of 6,500 tons, with two heavy auxiliary oil engines of 2,000 h.p., by Messrs. Schneider and Co., of Creusot. The France, which displaces nearly 11,000 tons, and is at present the largest sailing ship in the world, is intended for the New Caledonian iron ore trade of a Rouen firm. Great improvements have been made in the yards within recent years, and firms are now able to carry out the best classes of work. There are a large number of mercantile contracts on hand, especially at the yards of the Mediterranean Company, of La Seyne and Havre, the St. Nazaire Company of St. Nazaire and Rouen, and the Loire Company of Nantes and St. Nazaire.

United States.

American shipbuilders in general had rather a poor year, and their aggregate tonnage is considerably lower than that of Germany. In 1910 they launched more than was built in Germany, but in 1911 their output decreased, while that of the German builders increased from 218,000 tons to 400,000 tons. It may be noted, too, that there are several warships in the American returns, though not so many of large size as were launched in Germany. The Argentine Dreadnoughts Moreno and Rivadavia were launched at Camden and Quincy respectively, the United States battleship Wyoming at Philadelphia, a destroyer at Philadelphia and another at Newport News, two submarines at Quincy, one at Newport News, one at San Francisco, and two at Seattle, while a small Cuban cruiser was launched at Philadelphia. The output of the American Shipbuilding Company's five yards—those at Chicago and Superior launched no vessels—is very much lower than it was in 1910, and their total is not so high as that of the one yard of the New York Shipbuilding Company. Only a few motor vessels were launched during the year. Of these, two built at Camden are being supplied with gas engines, while at Morris Heights, New York, four yachts were launched for propulsion by oil engines. That United States builders are still far from able to quote prices so low as those offered by United Kingdom firms is evident from the way in which American contracts continue to come to this side of the Atlantic, even although there are frequent agitations in shipbuilding circles, especially on the West Coast, in favor of retaining work at home even at higher prices. At present, however, most of the large yards, especially on the Eastern seaboard, have naval work on hand which is keeping them fairly busy.

(Continued in February Issue.)

1911 Marine Engine Progress

THE feature of marine engineering has been steady progress along lines with which the industry is more or less familiar. No new engine—none newer, at any rate, than the Diesel oil engine—appeared to give shipowners concern about their fixed capital, and as a rule the controllers of both naval and mercantile shipping went on doing the old work of mechanically propelling sea craft in, if not always the old way, new ways which experience had proved to be for particular purposes more suitable or more economical.

The reciprocating steam engine continues to hold its own for a wide range of work, as the figures of horse-power given elsewhere in this issue abundantly testify. It is bigger on the average than it was, because the types of vessels which it drives are bigger. It is more economical, partly because of its improved design and construction, but largely owing to the development of its auxiliaries. Its first cost is also less. This is in part a result of the standardization to which Lord Furness alluded recently at the annual meeting of Messrs. Richardsons, Westgarth & Co For the rough and tumble of sea work, its reliability is a great recommendation, and in combination with the other qualities which have been indicated, this caused it to be preferred for cargo boats and the great majority of cargo and passenger liners of less than 15 knots speed. The improvement in engine-room auxiliaries, to which allusion has been made, includes the condenser, air and circulating pumps, hot-well pump, feed pump, and feed heater. What has been achieved by the improvement of appliances of this character everybody associated with shipbuilding and engineering knows. The most striking tendency of the progress is probably, however, to take auxiliaries off the main engines and drive them independently. It has been appreciable particularly in fast boats for some seven or eight years, and it will probably be the general practice before very long.

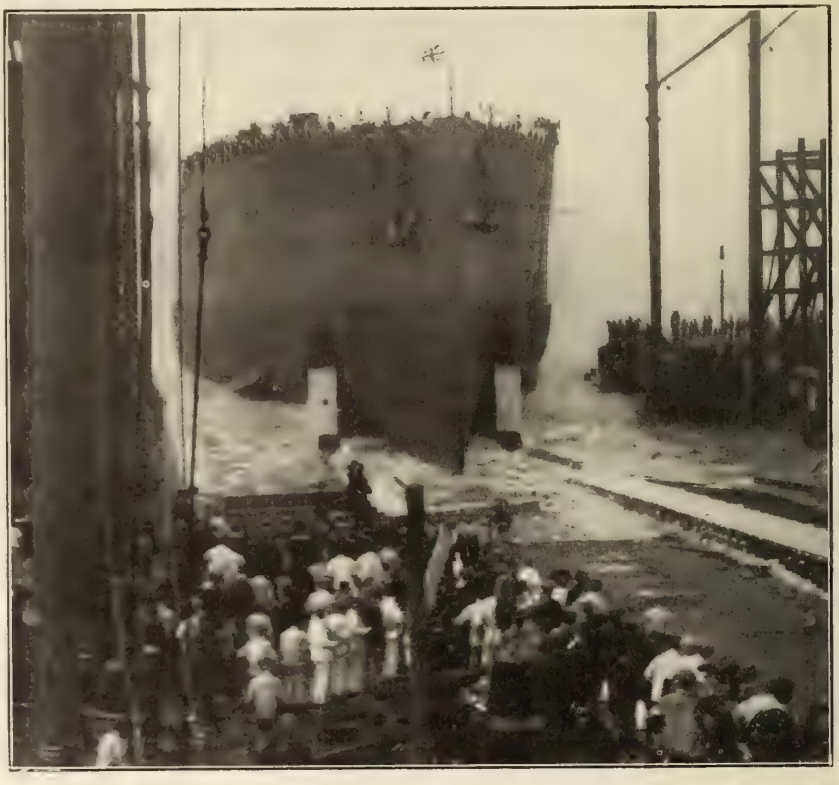
The Making of Turbines.

Marine turbines of the Parsons type were manufactured more largely in 1911 than in any preceding year. According to the annual report of the Parsons Co., up to June 30, turbines representing about 6,100,000 horse-power had been made; of these 1,900,000 horse-power belonged to 1910-11. At midsummer, machinery of 2,740,000 horse-power for 167 British and Colonial warships was under construction. In warship work, the Parsons turbine has made most rapid progress and has been developed furthest and most successfully. The effect of this naval forcing has been of course indirectly good for mercantile shipping. The triple-expansion turbines of the Aquitania and the new Canadian Pacific liners are instances, and not solitary ones, of this beneficient influence. While it is true that there are more turbine warships than turbine merchant vessels in the world, the horse-power of the turbines in mercantile steamers and yachts is by no means inconsiderable. Of the 6,400,000 horse-power quoted, its total amounts to 1,100,000. For most of the variations of the type as first fitted on a British warship, the naval authorities have been responsible—in association of course with the Parsons Co. The arrangement of impulse and reaction types, as applied to one or two destroyers and to at least one cruiser, is development due to the requirements of warship work. There are also adaptations to suit the cases of cruisers and large battleships which have to go long distances at cruising speeds. Cruising turbines are, for example, expensive in weight, which may in a warship be more profitably used in other directions.

Turbine destroyers with the Parsons mechanical gear are also being built. For high-speed merchant ships, the reaction type, working in series on three or four shafts, is so successful, as a rule, that only in detail does it seem to be susceptible to improvements.

For Slower Vessels.

For ships of intermediate speeds like the Titanic, the Orama, the Arlanza, and the Rochambeau, a combination in which reciprocating engines exhaust into low-pressure turbines finds favor. The arrangement is economical, as the trials of the Orama conclusively proved, and that it has been satisfactory in every instance up to date seems to be proved by the repeat orders that have been placed. The majority of the existing vessels with this type of machinery have three screws, with the turbine on the centre shaft, but the Rochambeau is a four-screw ship with reciprocating engines on the two inner shafts and turbines on the two outer shafts.



Launch of the Super-Dreadnought "King George V." at Portsmouth. The Photo Shows the Vessel Taking the water.—L.P.A.

Turbines fitted with the Parsons mechanical gear are being made for two new London and South-Western Railway steamers, as well as for the destroyers, to which allusion has been made. This is the transmission system which was installed experimentally on the steamer Vesparian, and the success of which in service was expected to revolutionize the ocean-carrying trade of the world. Its success has been unmistakable, and its tardy adoption for slow-going craft is difficult to explain except on the score of high first cost. Nothing is calculated to turn a shipowner from a project faster than higher first cost. Turbines geared in this way are economical for slow speeds, and the transmission is efficient and reliable. After 32,000 miles of North Sea work in all kinds of

weather, the pinions and gear wheel on the Vespasian showed no appreciable signs of wear. Neither gear nor turbine gave the slightest trouble from first to last. No other transmission system has been tried on this side of the Atlantic on the scale of an ocean-going vessel. At one time it seemed likely that the Fottinger hydraulic gear would be installed on two new turbine steamers for the Dover-Ostend service, but it is understood that the construction of these vessels has been indefinitely postponed. The Fottinger gear has been fitted to a British coaster owned by Mr. Holzapfel, and is said to be doing fairly well. In this case, however, it is the power of a gas engine which is transferred and transmitted to the propeller.

Of Brown-Curtis turbines not a great deal of information is available, chiefly because the type is exclusively used in Great Britain in protected cruisers and destroyers. It is the engine which is installed in the new Argentine ships, and it finds favor also on the Continent—in scouts, for example, for the Italian Navy. That it is succeeding, especially in the Brown-Curtis form, seems to be proved by the growing favor which it is finding in the eyes of naval authorities.

Improved Auxiliaries.

The value of improved engine-room auxiliaries in the development of the turbine is at any rate not lower than it is in the development of the reciprocating engines. It is probably higher, because with a vacuum guaranteed by the maker of the condenser the design of the turbines is simplified. Weir's uniflux condenser and dual air pump have not only achieved wonders in that direction, but they have enabled turbine makers to achieve wonders. They have been adopted by the naval authorities of Britain, the Argentine, China, Chili, Italy, Russia, the United States, Austria, France, Brazil, Denmark, Japan, Spain, and Turkey; and for high vacuum turbine driven merchant vessels they are practically the standard. Already they have been applied to machinery representing over 4,000,000 shaft horse-power.

Superheated Steam—Oil Fuel.

Two minor developments of steam engineering are worthy of note. One relates to the use of superheated steam and the other to oil fuel. Up till now the chief objection to superheating has been that no satisfactory superheater was available. On the North-East Coast of England, however, a steamer designed for reciprocating engines is to have the Schmidt superheater—an appliance which is understood to have given excellent results on many vessels. No longer ago than 1909, Sir Henry Oram said that the use of superheated steam in turbines did not seem to warrant the extra risks involved. That may still be the opinion of the engineer-in-chief of the fleet, and the view may be absolutely correct, but in any case it would have been foolish to take risks with Parsons turbines using ordinary saturated steam giving the excellent results which they do. The oil fuel development is the association of Howden forced draught with the system of oil burning in which the Wallsend Slipway and Engineering Company specialises so successfully. At Wallsend, the oil burning installations made during 1911 and now in progress represent applications to something like 150,000 i.h.p.

Oil Engines.

So far as ocean-going shipping is concerned the oil engine is still to all intents and purposes in the experimental stage. It is true that two vessels—the Toiler and the Vulcanus—have successfully endured prolonged spells of sea service, and that nearly a score of fairly large ships are in various stages of construction, but the attitude of shipowners and naval experts still seem to suggest that their preference is to keep an open mind on the subject. Thirteen or fourteen oil-engined vessels, ranging in gross tonnage from 4,500 to 8,000 are being built to Lloyd's classification, and six ranging in gross tonnage from 100 to 3,800 are being, or have been, built to the classification of the British Corporation. Other vessels are being constructed no doubt on the Continent, but those indicated are the only ones of which authentic particulars are available. Taking them all over, there is a perplexing variety in the design of the engines which is well calculated to make the ordinary shipowner hesitate. One of the British Corporation vessels—Messrs. Barclay, Curle and Co.'s Jutlandia—has four-stroke engines, and five have two-stroke engines. They are all single-acting. In the vessels which are being built to Lloyd's class there are both two-stroke and four-stroke engines, and one of the two-stroke engines is of the double-acting type.

What the outcome will be is difficult to say, but for marine work the two-stroke single-acting type seems, as matters stand, to be the most suitable. Despite the talk of oil-engined war craft there does not seem to be much doubt that none of the navies of the world has got the internal combustion engine for moderately large vessels past the experimental stage. Its most successful development has been for submarines, and the requirements for under-water craft are not quite the same as those for surface vessels. At Barrow an interesting experiment on a more ambitious scale is understood to be in progress, and at Southampton a destroyer is being built which will have oil engines instead of cruising turbines. The Admiralty have also acquired Continental engines like the Sulzer-Diesel and (it is said) the F.I.A.T. for experimental work in small craft No foreign naval authority is doing more than that, and several are not doing quite so much.

Gas Engines.

The gas engine in Holzapfel I. has been mentioned. An engine of the same type but designed to drive direct, is being made for the large auxiliary yacht which Messrs. Napier and Miller, Yorker, Scotland, are building. The plant consists of two producers, and main engines of 220 h.p. by Messrs. Hindley & Son, Bourton, Dorset, and reversing is effected by means of a Bevis reversible feathering screw. There are considerable savings of weight and space as compared with the lay out of reciprocating steam engines of the same power, and the experiment is certain to be watched with interest.

AS OTHERS SEE US.

"Syren and Shipping," in its issue of November 29, says:—"From Toronto there comes a new journal which should enjoy rapid and lasting success. Marine Engineering of Canada, as it is called, is issued by the MacLean Publishing Company, Limited, and will appear monthly. It will deal with the progress and development of merchant and naval marine engineering, shipbuilding, and the building of harbors and docks. It is well-got-up and capitally illustrated, while, if the first number be any criterion, the reading matter will possess a high degree of interest. The moderate subscription of one dollar brings it within the reach of all students of shipping."

THE CHEMISTRY OF COMBUSTION

By J. W. Hayward, M.Sc.

IT is usual to speak of the coal alone being consumed in a boiler furnace, but it would be just as correct to speak of the air passing through, as the fuel burnt. In fact it would express better what happens, since twelve pounds of the latter are used up for each pound of the former. This air measures 13 cubic feet at 60 degs., and at 2,000 degs., the temperature of the fire, it measures 62 cubic feet. It requires two substances to make combustion, just as two persons are necessary to a quarrel.

Essentials for Combustion.

The essentials for combustion are, that the individual particles of the substances to be united, shall come into actual contact with one another, when at a temperature sufficiently high to

cause their union With gaseous mixtures, the particles intermingle naturally, but it is impossible to mix air so thoroughly with a solid like coal, that the latter may be fully consumed. In the best practice an excess of 100 per cent. of air, and in bad practice, much more, finds its way past the fire, unconsumed. This costs nothing, it is true, but since it reaches the chimney some four hundred degrees hotter than it enters the ashpit, it carries off with it heat that would otherwise be available for steam raising.

The particles of air round a lump of coal, may be compared to pigs round a trough. Some get a full feed, some get a bite, while some are crowded out and get nothing. Air is a mixture of two gases, oxygen and nitrogen, in the ratio of 23 pounds of the former to 77 of the latter. The nitrogen takes no part in the combustion; in passing through the fire, it is heated; in passing through or around the boiler tubes, it is cooled, although not to its original temperature; consequently it carries heat up the chimney. The oxygen alone enters into combination.

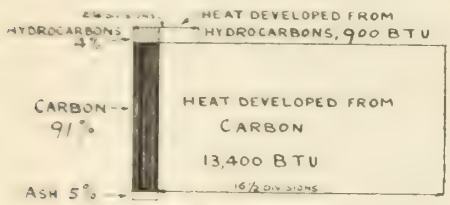


Fig. 1—Anthracite

Coal is not like air, a substance of uniform composition. It is a mixture in varying proportions, of carbon, of compounds of carbon and hydrogen called hydrocarbons, of some incombustible matter forming ash and clinker, and two or three per cent. of moisture.

The accompanying table gives the compositions of a high grade Pennsylvania anthracite, and of a low grade soft coal from Nova Scotia, after the moisture has been dried out of each. Most steam coals lie between these limits.

	Pennsylvania anthracite	Nova Scotia soft coal
Volatile hydrocarbons	4 p.c.	37 p.c.
Carbon	91 p.c.	48 p.c.
Ash	5 p.c.	15 p.c.
	100 p.c.	100 p.c.
Heating value B.T.U.	14,300	11,500

From the heating values it is apparent, that for every dollar asked for the poor coal, it would be advantageous to pay up to a dollar and a quarter for the anthracite.

Process of Combustion.

During combustion, the carbon combines with the oxygen of the air in the ratio of one pound to two and two-thirds, forming carbon dioxide gas. For each pound of carbon burnt, heat to the extent of 14,500 thermal units, or enough to evaporate 12½ pounds of water under normal condition, is generated. The particles of carbon have unfortunately a way of satisfying themselves with only half the above proportion of oxygen, if the supply is meager. The product is then carbon monoxide gas, and only 4,450 thermal units are generated. Carbon monoxide will itself burn to carbon dioxide, generating the balance of the 14,500 thermal units, if it meets with fresh oxygen, when it is still at a high temperature. It burns with the blue flame often seen above a clear fire.

The presence of unburnt carbon monoxide in the chimney, can only be determined by chemical analysis of the flue gases. Experience teaches that it begins to appear when less than 20 pounds of air is admitted to the furnace, per pound of coal. Combustion of the carbon takes place upon the fire bars. The heat generated is in part transmitted to the boiler plates and tubes by direct radiation, where these are exposed to the fire; in part, it is also given to the carbon dioxide and air, which in their turn, give it up to any surface cooler than themselves and over which they pass. The hydrocarbons are largely evaporated by the heat of the fire, and readily split up into carbon and hydrogen. The union of carbon with oxygen has already been discussed. Hydrogen combines with oxygen in the proportion of one pound to eight to form steam, 51,700 thermal units being generated for each pound consumed. The hydrocarbons burn in the combustion space above the fire, the reaction being indicated by flames. If the temperature of these burning gases is lowered by striking the comparatively cool surface of the boiler, the reaction will be checked, and the carbon of the hydrocarbons will pass on unconsumed as smoke. Smoke will also result if insufficient air is supplied.

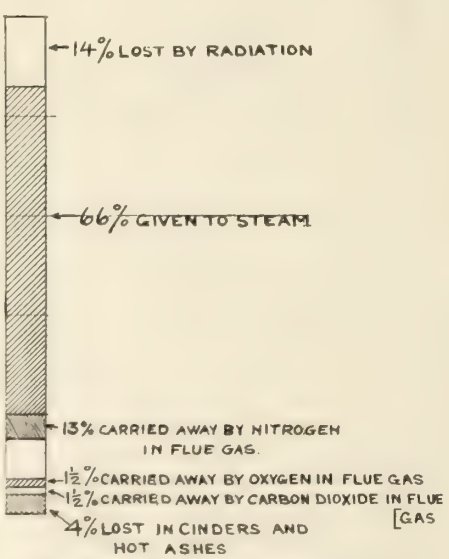


Fig. 3—Distribution of heat from coal burned in a well-managed boiler-house.

The Smoke Nuisance.

The smoke nuisance is then due to one or both of the above causes, and can be cured by removing them. A large space above the fire will give the hydrocarbons opportunity to burn completely, and a separate supply of air to this space provides the oxygen required to complete the combustion of them. The amount of air just necessary to prevent smoke, must be determined by experience, and no more should be admitted; otherwise the attempt at smoke prevention will lead to a waste, instead of a saving, of heat and fuel.

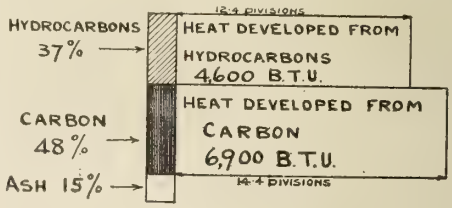


Fig. 2—Soft Coal.

The incombustible matter in coal gives trouble in proportion to its quality, rather than its quantity. If infusible, it merely forms a fine ash, which readily drops between the fire bars. If, on the other hand, it melts at the fire temperature, it spreads out as a thin sheet of clinker, and stops the supply of air to the fresh coal above it. Trouble with clinker is reduced by any contrivance which will cool the under side of the fire, and congeal the fused ashes before they run into sheets. A common expedient is to blow steam into the ashpit. The oxygen in steam has a greater affinity for the free carbon it finds in the fire than for the hydrogen with which it is already united. It consequently turns off the one to unite with the other, forming carbon dioxide and carbon monoxide. This reaction absorbs much heat, and so cools the fire. A similar scheme is employed in gas producers to reduce the waste of heat. Above the fire, air is supplied to reburn the hydrogen formed, and to complete the combustion of the carbon. The heat taken from the bottom of the fire is regenerated in the combustion chamber. If waste steam is used, no loss of efficiency need occur.

"To have the courage of your opinions is a great thing. It is a greater thing to have an opinion which is worth being courageous about."

THE PUISSESSEAU CARGO DERRICK.

ALTHOUGH port and harbor development has in recent years made rapid progress, it must be admitted that as far as mechanical cargo handling appliances are concerned, the scope of the improvement has been limited almost entirely to what may be termed



Application of the Puissesseau Cargo Derrick

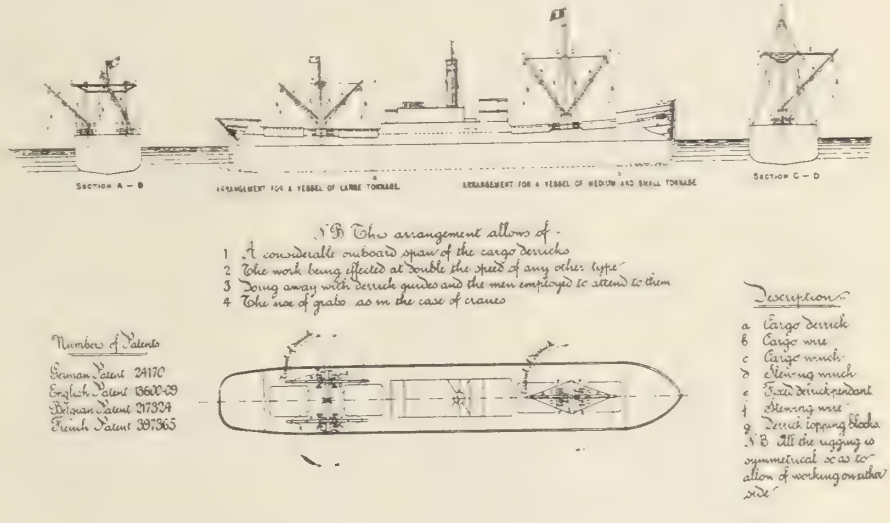
those great national ports, whose trade is that of regularly established large steamship lines, supplemented by coastwise and individually owned merchant vessels. It is still a requirement of the world's shipping that suitable loading and discharging apparatus be installed on board ship, and in this field a record of steady forward progress is apparent. Because of the fact that a large percentage of the world's commerce is and will continue to be between ports whose location and equipment afford little or no assistance to the unloading or loading of a vessel's cargo, much opportunity exists for the display of inventive genius along the lines of rapid and effective self-contained devices.

The Puissesseau Cargo Derrick, which we describe and illustrate here, is the invention of M. R. Puissesseau, superintendent engineer of the Nouvelle Societe Navale de l'Ouest. It consists of a boom pivoted at the lower end to a point near the bottom of its supporting mast, and arranged to derrick on a hinge, and to slew in the usual way. Its upper end, however, instead of being supported by a single pendant attached to the mast and lying in the plane of the boom, as is usual, is held by two pendants which lie approximately in a horizontal plane. These are carried from the boom to blocks fixed at the outer ends of a crosstree which lies athwartships, and is secured to the upper part of the mast. One of the pendants is fixed to a cleat on deck, and remains of a fixed length while the derrick is working; the other is led round the drum of a winch, so that it can be either wound up or payed out. The operation of the winch controlling this second pendant also slews the derrick. The lifting of cargo is performed independently of the gear, and may be carried out while slewing is in progress, as with ordinary equipment. The arrangement enables freight to be swung outboard considerably further than by an ordinary cargo-derrick; the extra distance being practically equal to half the length of the upper table. The outboard distance reached by an average derrick on this plan varies from 15 to 19 feet.

Advantages of the Puissesseau Derrick.

In addition to this apparatus being simple in its detail and operation, several important advantages are claimed, of which the first is that the speed of working is about double that of an ordinary derrick gear, owing to the rapid and easy slewing that is possible. In the second place, it is stated that when a boat is lying in an open roadstead with quite a sea running, it is still possible to work cargo. This point, which is, of course, of very great importance, follows from the disposition of the pendants holding the derrick. Even with a considerable list on the boat, the pendant on the higher side will still exercise a controlling pull on the derrick and determine its position in a way that is impossible with a single pendant lying in the plane of the jib. This second feature of the appliance is not simply theoretical, but has been demonstrated in practice on boats fitted with the gear. A third point claimed, is, that, with the is to be recommended. In the latter case, for slewing the derricks, less powerful single purchase winches are sufficient. The groups of two winches may be replaced by double winches, that is to say, winches with two barrels working independently and driven by one man. This device allows, as in the case of cranes, the use of grabs for coal and ore cargoes.

Langstaff, Ehrenberg & Pollak, Leadenhall Buildings, London, E.C., are the representatives in Great Britain for the patentee and manufacturers, and their reports show that large advantage is being taken by vessel owners to install complete sets of the apparatus.



Diagramatic Application of th e Puissesseau Cargo Derrick.

whole controlling-gear overhead, there is less likelihood of accidents to men owing to their tripping over ropes or stays and falling down hatches or overboard.

The most suitable plant for small and medium sized vessels is one derrick and two winches per hatchway, while in the case of very large vessels which operate on both sides, the double plant with side stump-masts supporting the derricks, each having its group of winches,

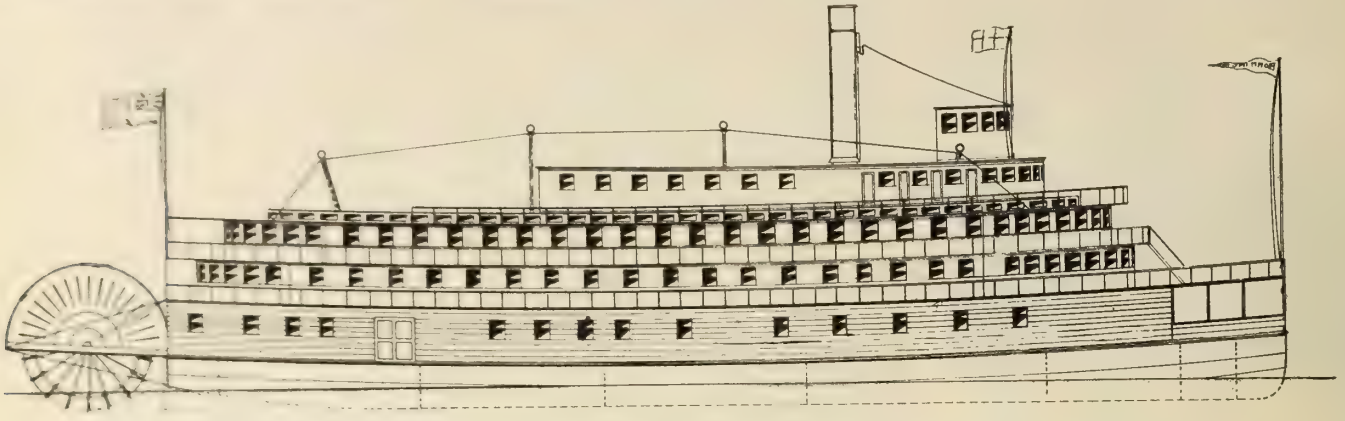
MARINERS PROTEST DECISION.

At the regular meeting of the Shipmasters' Association held recently in Vancouver, steps were taken which may result in an appeal from the decision of the marine court in suspending the certificate of Captain W. S. Morehouse for six months and Chief Officer A. B. Bowley's certificate for four months, as a consequence of the stranding of the steamer Venture in Johnston Straits, Sept. 12 last. The shipmasters were of the opinion that the court was extremely severe, when results of former inquiries and the perils of B. C. coastwise waters are taken into consideration. The Shipmasters' Association did not impugn the motives of the court, but protested against officers unacquainted with local conditions giving such a severe decision. A special committee was appointed to inquire into the circumstances of the case, and the report of the committee will decide whether Ottawa will be petitioned, to urge that marine courts, constituted to try cases, be selected from master mariners having a knowledge of the coast in question.

C.P.R. LAKE STEAMER "BONNINGTON."

By F. A. W.

THE steamer Bonnington, shown in the accompanying illustration, was built and engined by the Polson Iron-works Co., Toronto, to the order of the Canadian Pacific Railway Co. for their British Columbia inland lakes service.



C.P.R. British Columbia Inland Lake Stern-wheel Steamer "Bonnington."

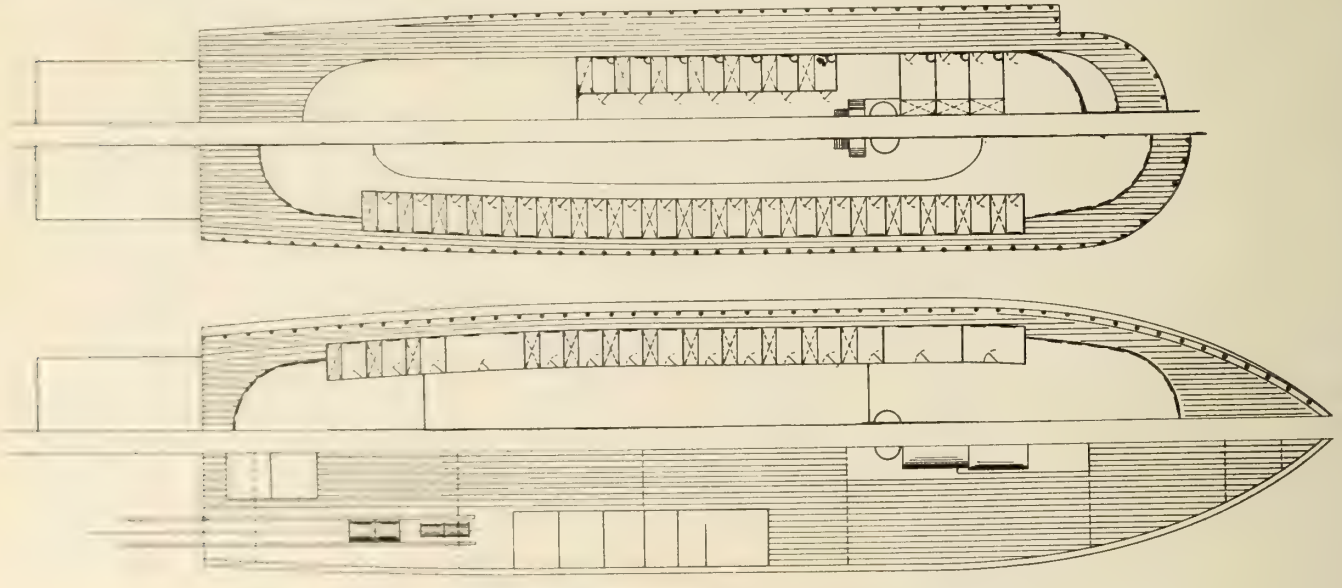
The hull was put together at the builders' yard, taken asunder, shipped to its destination and finally completed there. The Bonnington is the largest vessel yet place on this particular service, her leading dimensions being as follows :— Length between perpendiculars, 200 ft.; beam molded, 38 ft.; beam over guards, 45 ft.; depth molded, 7 ft. 6 inches.

Ship Scantlings.

The frames are of 5 x 3 x $\frac{3}{8}$-inch angles fitted intercostally between the longitudinal watertight bulkheads, and connected by flanged brackets 18 x 18 x $\frac{1}{4}$-inch. The rise of floor is three inches in a half breadth of 19 ft., with a bilge radius of 18 inches. From the transom to No. 2 bulkhead, 18 inches spacing is arranged ; from No. 2 bulkhead to No. 5 bulkhead, 21 inches spacing ; from No. 5 to No. 6, 18 inches spacing, and from No. 6 to No. 7, 15 inches spacing. The 4 x 3 x $\frac{3}{8}$-inch beams, fitted in every frame, are cut at the watertight bulkhead, and 16 x 16 x $\frac{1}{4}$ inch brackets are fitted. The sponson beams are placed on alternate frames of the same scantling, being bracketed to the shell by 18 x 18 x $\frac{1}{4}$ inch knees, and securely fitted to the fender channel of 8 x No. 14 section.

The centre keelson is composed of an intercostal plate, 18 x $\frac{1}{4}$ inch, flanged to keel plate, and has two longitudinal angles $2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$ inch running fore and aft, secured to frame by single clips $2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$ inch. The centre top girder plate and angles are of same scantlings, the former being flanged to the deck tie-plate. The vessel, longitudinally, is divided into seven watertight compartments by six transverse bulkheads, and is divided transversely into three watertight sections by two longitudinal watertight bulkheads. The transverse bulkheads are composed of $\frac{1}{4}$ inch plating, fitted vertically and stiffened by a 3 inch flange. The longitudinal bulkheads are composed of $\frac{1}{4}$ inch plating flanged to deck and shell, and stiffened by $2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$ inch angles fitted on alternate frames.

The deck stringer, 54 x $\frac{1}{4}$ inch. flanged to fender channel and extending 18 inches inboard from molded breadth, runs right fore and aft. In way of the machinery, the deck is wholly plated, but elsewhere 2 x $\frac{1}{4}$ inch tie plates are fitted :—one on centre line, one above watertight bulkheads, and one each side of hatch openings. The bracing consists of 5 x 3 x $\frac{3}{8}$ inch vertical angles, spaced five frame spaces apart with 3 x 3 x $\frac{3}{8}$ inch diagonals, securely bound together by 12 x 12 x $\frac{1}{4}$ inch cross ties, which in the centre run from transom to boiler room. The machinery girders are placed directly above the longitudinal bulkhead and engine bracing, the latter being composed of the same scantlings as the centre line bracing. The boiler saddles are fitted between the longitudinal watertight bulkheads, and are braced fore and



C.P.R. British Columbia Inland Lake Stern-wheel Steamer "Bonnington."

aft and athwartships by bracings fitted to special girders placed in the boiler room. The main support to the boiler is given by channels fitted vertically in box form, and securely bracketed in all directions.

To support the wheel and bearings aft, four brackets, 16 ft. long of $\frac{3}{8}$ inch plate



C.P.R. British Columbia Inland Lake Stern wheel Steamer "Bonnington."

with 6 x $3\frac{1}{2}$ x 7-16 and 3 x 3 x $\frac{3}{8}$ inch angles, are fitted. The keel plate is $\frac{3}{8}$ the bilge 5-16 inch, and the bottom $\frac{1}{4}$ inch thick. Treble riveted lap butts and double riveted joggled landings constitute the fastenings. There are four rudders, having stocks $4\frac{1}{2}$ inches diameter with forked tail pieces, into which 3 inch planks are fitted. The three side keelsons and deck girders fitted each side are of 4 x $2\frac{1}{2}$ x $\frac{3}{8}$ inch tee bar, and vertical stanchions of $2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$ inch are fitted to them about 12 ft. apart. Generally speaking, the steel hull is of very light construction, but great consideration has been given to the vessel's longitudinal strength by the introduction of bracings and bulkheads.

Woodwork and Interior Arrangement.

The woodwork equipment and interior finish was carried out by the C.P.R. employes at Nakusp, B.C.

From the point of view of naval architecture, the Bonnington with her four decks, is a remarkably handsome boat, with graceful lines. On the main deck, in addition to the machinery, there is a suite of rooms for the cuisine and the crew's quarters. The main saloon deck, the gallery deck and the Texas deck, which constitute passenger-land, are laid out particularly with an eye to comfort. In the fore part of the main saloon deck is the men's smoking room, the purser's and steward's offices, and other rooms relating to the dining service. The spacious dining room is amidships, the furniture being of golden oak and Australian mahogany. It is 72 ft. long, 21 ft. 6 inches wide, two-stories high, and is flanked by two tiers of state rooms. The after part of this deck, the ladies' cabin, is furnished with Wilton carpet, leather and Morris chairs and mahogany arm chairs. Fore and aft on the gallery deck are observation rooms. The forward of these is equipped with wicker plush furniture, centre tables and writing desks, while the after one is furnished in early English style. The idea of comfort prevails equally on the Texas deck, where the after part is devoted to a sitting room. The forepart contains commodious officers' quarters. There are in all 62 state rooms, two being equipped with baths and four arranged for family groups. All are steam heated, electric lighted, and have electric bell communication. The electric lighting plant consists of a dynamo and 50 horsepower Ideal engine. In addition to the general ship lighting, there are two high candle power boom lights for freight handling purposes, and two powerful search lights. A complete fire protection service is installed throughout the ship.

Machinery Features.

The Bonnington is equipped with two sets of tandem-compound engines, with cylinders 16 and 35 x 96 inches stroke, each capable of developing 500 h.p. at 27 r.p.m. The low pressure cylinder valves are of the double ported balanced type, while the high pressure valves are of the piston type. The connecting rod, of built steel, is 32 ft. between centres. The crank shaft, of nickel steel, is 14 inches diameter, and has a 6 inch hole through it. The paddle wheel is 24 ft. diameter over the floats, of which there are 20, with a length of 21 ft. 6 inches.

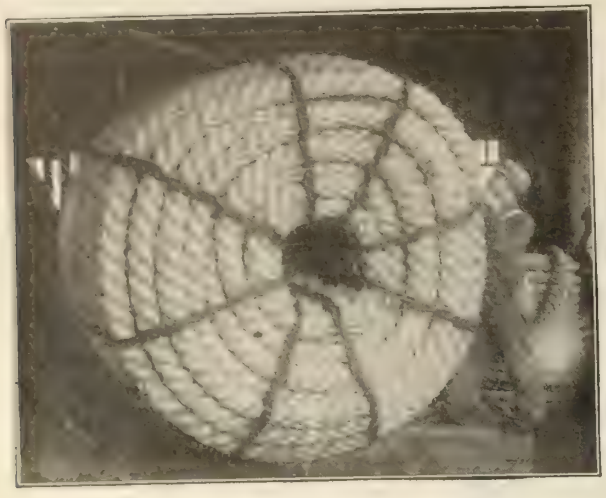
The condenser is of the independent vertical jet type in one unit. Steam is supplied by one locomotive type boiler 90 inches diameter and 28 ft. 4 inches long, built for 200 pounds working pressure. The grate area is 70 square ft.; heating surface, 2,800 square ft., the tubes being $2\frac{1}{2}$ inches diameter. The forced draught equipment consists of a No. 7 Sturtevant Multivane Fan driven by a No. A-2 turbine with helicoidal drive. A steam reversing engine, sanitary and boiler feed pumps, steam



C.P.R. British Columbia Inland Lake Stern-wheel Steamer "Bonnington."

capstan, windlass and steering gear form additional handling equipment on board.

The C.P.R. officials, more directly concerned with the design and successful completion of the Bonnington, were Captain J. C. Gore, marine superintendent, C.P.R. British Columbia lake and river service; G. H. Keyes, foreman joiner, Nelson, B.C.; J. Fyfe, chief engineer, the Nakusp shipyard; James McPhee, electrician, Nelson, B.C.; James Bulger, general shipyard foreman, Nelson, B.C., who had charge of the launching arrangements, and D. Stevens, superintendent engineer, designer of the hull and machinery. Captain L. H. Fraser, late of the steamer Kootenay is in command of the Bonnington.





16-inch Wrecking Cable -The Plymouth Cordage Co.

A FOUR-TON COIL OF CABLE.

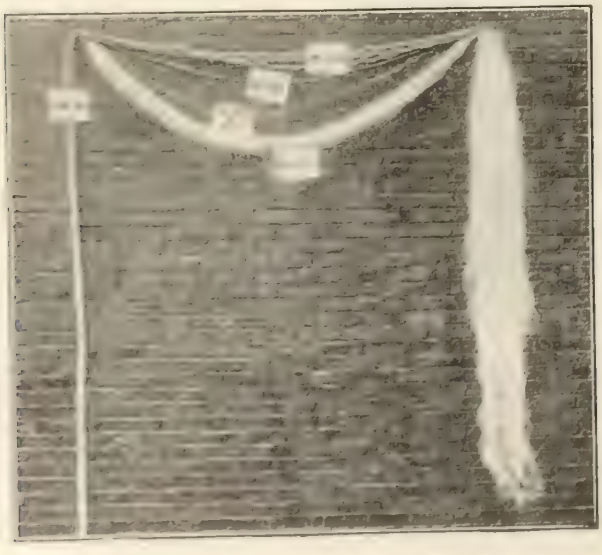
THE huge coil of 16-inch wrecking cable shown in one of the illustrations herewith, gives some idea of the ropemaker's capabilities. This coil, which stands 7½ feet high, is one of a pair of hawsers recently made by the Plymouth Cordage Co. for the Merritt & Chapman Wrecking Co.

Each coil contains 1200 feet, or nearly a quarter mile of the finest long-fibre Manila rope. Its size, in comparison with cables commonly used, may be appreciated when it is understood that although a three-inch diameter rope, containing 399 threads of yarns is counted unusually large, the cable shown in the picture is made up of three such large ropes, and contains 1197 threads or yarns. The picture, showing a one-inch diameter rope beside a section of the big cable, suggests the strength of the latter. A cable similar to this, and also made by the Plymouth Co., was used to haul the American liner "St. Paul" off the rocks on the Jersey coast some years ago.

Elasticity gives the Manila cable an advantage for wrecking work, the extent of the "give" or "spring" in a fine Manila rope being illustrated by the behavior of the Plymouth nine-inch cable used for the stops at the launching of the Argentine super-dreadnought "Rivadavia." These stops, consisting of 30-foot lengths of rope joining the shore and the ship chains, stretched about 6 feet before breaking. Steel cables are suitable for towing, but in large wrecking operations, where a ship's hull has to be dragged against the resistance of solid matter, something less rigid is desirable to lessen the tendency to jerk, a contingency more or less destructive to both wrecking tug and wreck.

THE LATEST ATLANTIC LINER.

Not a great many years ago, the new Anchor liner "Cameronia," the latest addition to the fleet of large passenger ships on the Atlantic, would have been hailed as the largest ship afloat; but so rapid is the increase in length and size, that a handsome ship of this class will slip into a port like New York on her maiden voyage with scarcely more than a passing notice. She is 530 feet in length, and at full load displaces 17,000 tons. Built in the yards of D. & W. Henderson & Co., Ltd., she is not only the largest vessel launched from that yard, but is the most up-to-date vessel possessed by the Anchor Line.





16-inch Wrecking Cable—The Plymouth Cordage Co.

WRECKING PLANT AT SYDNEY, CAPE BRETON.

IN the following letter to the Montreal Star, the writer demonstrates the necessity for a dry-dock and wrecking plant at Sydney, C.B., and indicates the probable advantages likely to result from its installation.

"To one whose connection with the shipping business on the St. Lawrence goes back to the time when the Hon. John Young's "Twenty Foot Channel" seemed Utopian, the growth of recent years is nothing short of amazing. In ten years, 1900-10, the sea tonnage of the port of Montreal has grown from 1,463,048 to 2,633,222 tons, an increase of about 90 per cent. The other ports have developed correspondingly, all of which is surely justification for the expenditure during the same period, of some $20,000,000 in making navigation more safe. Canada is now at the threshold of a period of expansion, which, it is safe to say, will far surpass its growth at any previous time in her history. How much of the commerce, to which the growth of Canada, East and West, is bound to give rise will pass by the St. Lawrence? Other things being equal, the greater part of it. Nothing is more easily moved than shipping, and it will fill almost immediately any demand which arises for it.

The difficulty confronting the St. Lawrence trade is, that insurance rates are very materially higher than those of the ports which compete with Montreal and Quebec for Canadian business. The detriment from this cause has been lucidly set forth in the pamphlet of Major Stephens, the chairman of the Montreal Harbor Board. The insurance rates are higher because from the ice-track, eastward of Newfoundland, to Montreal, say one-third of the ordinary trans-Atlantic voyage, the Canadian-bound steamer is in more dangerous waters than the steamer bound to competing American ports.

Splendid progress has been made towards prevention of accidents by the installation of perfected lights, signals and an enlarged channel, and what is required, as a complement to these safeguards, are facilities to prevent loss of life, and to minimize loss of property to owners and underwriters when accidents occur. Either one is as important from the standpoint of insurance as the other. The building of a first class dock at Montreal is based on this principle.



Dry Dock and Wrecking Plant at Sydney, C. B., showing by the Shaded Portion, the Area it Would Serve.

The purpose of this letter is to point out that another dock of the same kind, supplemented by a wrecking plant, at Sydney, would be at least equally advantageous to the trade of the St. Lawrence. Sydney is nearer that part of the danger zone, from Anticosti to a little east of Sable Island, than any other Canadian port where a dry dock already exists or is projected. Through the hundreds of miles of this navigation, every vessel in the St. Lawrence trade passes. It is that part of the voyage, moreover, where salvage is most difficult. The chances of a stranded vessel becoming a total loss are greater between Anticosti and the eastern limit of the ice-track than between Anticosti and Montreal. To the eyes of the underwriter, when a steamer and its cargo may be valued in millions, this difference is of importance. A dock and wrecking plant at Sydney would be the "first line of defence" to the St. Lawrence trade, and this, to the mercantile marine in its relation to natural dangers, is as important as to a navy in time of war. The project to build such a dock at Sydney, now in an advanced stage, demands the support of all interested in the commerce of the St. Lawrence."

BOILER COMPOUNDS.

THE following abstract from a paper read before the American Society of Naval Engineers, by Lieutenant Commander Frank Lyon, U.S. Navy, should prove valuable to all interested or engaged in the operation of steam boilers. While the tests and conclusions arrived at affect primarily marine boilers, it is at once apparent that to an equal degree stationary steam boilers come under their scope.

"In the summer of 1910 it became a part of the writer's duties to examine, test and report upon some boiler compounds with a view to finding those best suited to naval use. The literature upon the subject being very meager, it became necessary to devise a method of making the tests. The plan adopted and the principles involved are given as follows:

Requirements of a Boiler Compound.

The perfect boiler compound for naval or marine use will be one capable of fulfilling the following chemical requirements:—(a) It must render the water in the boiler non-corrosive at any temperature to which it may be subjected. (b) It must hold in suspension, or preserve in the colloidal form, all of the salts in the water that would otherwise be precipitated as scale, whether such precipitation be by the action of heat or by that of any of the chemicals used in the compound. (c) It must render the treated water no more liable to foam or

prime than distilled water would under the same conditions. (d) It must be composed of chemicals that are safe to store, that do not deteriorate materially with age, and that are non-explosive and non-inflammable. In other words, the compound must be such that it requires no particular care in stowage and handling. (e) Some one constituent must be such that its strength in the water (its concentration) can be easily measured by some simple chemical measuring device. In brief :—The compound must render the water in the boiler non-corrosive and non-scale forming ; it must be easy to care for and use, safe for stowage, and the net effect of its constituents must be such as will not increase the surface tension. The following is the series of tests suggested, to which all such compounds should be subjected : (A) Chemical :—(B) Corrosion :—(C) Scale removal :—(D) Priming.

How to Use the Compound.

A boiler compound, that will show excellent results under the foregoing tests, can be made to work in any boiler, with any water, if the boiler and water are properly treated. Many such compounds are condemned on first trial with boilers in actual use, because they do their work better than expected, and the man in charge of the plant fails to do his part. When contemplating the use of a compound, the man in charge must first understand the nature of the treatment, the results to be obtained, and have the co-operation of the fireman to obtain the latter in desirable measure.

Before putting a new boiler into operation, it should first be well boiled-out for at least 24 hours with a strong solution of the compound, using the surface and bottom blow-off for about two minutes each hour ; feeding with distilled water, if possible, to make up the loss, and adding more compound after each blowing-off. Again before starting the use of compound in an old boiler, the same preliminary details should have attention ; the reasons for their adoption being as follows :—

(1) When starting-up a new battery of boilers, there is always found more or less greasy scale and dirt thrown down, even when good distilled water is used for boiler feed.

(2) In an old boiler which is considered to be as clean as possible, a good compound will cut a very considerable amount of grease and scale from the apparently clean surfaces.

(3) In an old boiler which has not been cleaned, the action of the compound would first be to form colloidal solutions with any scale-forming ingredients that are in the water. The excess of compound then acts on the scale and grease attached to the various surfaces, loosening and throwing them down on to lower surfaces, and in time dissolving these impurities. If the boiler is boiled out, using good water with the compound, much of this scale and grease will be loosened and a great part of it can be removed through the blow off. After boiling and blowing for 24 hours, the fires should be allowed to die out, and before the pressure is entirely gone, all the water should be blown out. The lower manhole and handhole plates should then be taken off and all loose scale raked out. If this is not done the loose scale and greasy solution may do the boiler harm. The boiler should now be closed, pumped full of non-corrosive solution of the compound, and given a hydrostatic test for tightness. If tight, the water should be run down to steaming level, after which it is ready for regular operation.

When fires are started to put the boiler in regular operation the bottom blow-off should be used freely as steam rises. When steam is up to working pressure, the strength of the compound should be measured and brought up to that of a non-corrosive solution, if it is not already there. The saturation should then be taken with the ordinary salinometer pot and hydrometer bulb, its record being considered the base saturation. The strength of the solution and the saturation should be taken daily. The former as drawn from the boiler should be brought up to that of a non-corrosive solution whenever it is found below that strength, and the bottom blow should be used whenever the saturation is found 1.32 above that of the base, as shown by the ordinary marine hydrometer. If this method is carried out for a short period of time the boilers will be cleaned.

By keeping an accurate record of the amount of decrease of strength of solution daily, a fairly accurate deduction can be made as to how much additional compound is needed each day so long as the character of the feed water is not changed. When the constituents of the compound are non-volatile at the maximum temperature to which the boiler water is subjected (as they surely should be) the strength of the compound will remain constant if the feed water is pure and there are no leaks ; if the blow-off is not used, and if the boiler does not prime. The loss of strength is due to the constituents of the compound combining chemically with those of the dissolved scales and in the feed water, with which they re-act ; to the water lost by leaks and blowing-off, to the water carried over in priming, and to the make-up feed being assumed as fresh.

The writer has measured the alkaline strength of the non-corrosive solutions of the compounds, for the reason that all compounds and chemicals with which he has experimented and which stop corrosion entirely, except the chromate solutions, give an alkaline reaction. They require the same amount of 1-10th normal sulphuric acid to make a 50 c.c. sample show an acid reaction with the standard neutrality indicator. In my opinion, the only way to properly deal with the question is to measure the strength of the solution in water drawn from the boiler and treat it in accordance therewith. Any rule of treating water other than by measuring the strength of the solution as drawn from the boiler is dangerous, for the reason that if the character of the feed water changes at any time a different amount of compound will be needed with each character of feed water. The constituents in the compound should be so arranged that among the non-corrosive are included enough of the non-scale forming and non-priming elements to automatically make the perfect compound, in all characters of water when the solution is made non-corrosive. One thing that has been proved, is, that unless a compound be used properly it is better let alone.

Dangerous Compounds.

Due to the fact that many compounds have been devised for the purpose of removing scale without regard to their corrosive element, it is earnestly recommended that all compounds be tested for this, before they are used. The simple method used by the writer requires a measuring glass and a few clean glass bottles or fruit jars.

It is learned, from an examination of the Patent Office records, that there are boiler compounds, guaranteed to remove scale, of which hydrochloric acid is the base. Undoubtedly such a compound will remove the scale, also everything metallic with which it comes in contact.

There are found in some periodicals articles giving experience with graphite in boiler water, in which it is proved that graphite is an excellent scale remover. Graphite is a scale remover for the same reason as hydrochloric acid. It corrodes the metal underneath the scale and frees the scale from the metallic surfaces. The writer has found that steel boiler plate, immersed in distilled water containing graphite in contact with the metal, corrodes from 200 to 400 per cent. faster than specimens from the same plate immersed in the same water without the graphite, all other conditions remaining the same. The amount of corrosion varies with the purity of the graphite and with the amount of it in contact with the metal.



Dip your knife in water before cutting rubber gaskets. You will make a better job, and the knife will keep its edge longer. A little soda and water or potash and water will be better still, if obtainable.

MARINE ENGINEERING of Canada

A monthly journal dealing with the progress and development of Merchant and Naval Marine Engineering, Shipbuilding, the building of Harbors and Docks, and containing a record of the latest and best practice throughout the Sea-going World.

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Vol. II JANUARY, 1912 No. 1

THE WORLD'S SHIPBUILDING.

THROUGH the courtesy of the publishers of the Glasgow Herald, we have been privileged, in this, the New Year number of Marine Engineering of Canada, to place before our readers a concise and comprehensive statement of "The World's Shipbuilding and Marine Engineering Returns for 1911," together with articles on "Marine Engine Progress" and the "World's Warships." Marine men will find the subject matter to be not only highly instructive but also extremely fascinating reading, and as a result of careful perusal of the comparative data and developments, furnished and indicated, a larger and fuller realization of Canada's requirements and possibilities, in a similar direction, is bound to arise. The preeminence of shipbuilding and marine engineering, with their allied industries, is expressive of national greatness and individual hardihood, and we are constrained to believe that the acquisition of a like valuable industrial and commercial asset will be conducive of equally beneficial attainment and reputation to this Dominion and its people.

THE OUTLOOK.

WHILE the opening of this Year of Grace, 1912, finds the Dominion of Canada more intensely prosperous and progressive than at any previous period of her history, evidences are not wanting, that, for lack of strong individuality of leadership and proper control of the various and in most cases, foolishly divergent elements whose pet schemes and personal considerations are becoming offensively prominent, much curtailment and retardation of development for the general welfare is bound to quickly ensue.

The demand for removal from office of the three gentlemen composing the Montreal Harbor Commission—we referred at some length to the subject in our December issue—has grown increasingly insistent, and report has it that the pressure is being so powerfully and skilfully applied, that capitulation to the besiegers is imminent. The harbor of Montreal is no local affair, neither is its administration dependent upon the whim of a party section, a trio of office seekers, or for that matter at the redisposal, behest or desire of either, by this or that Prime Minister without real cause. The personnel of the Commission is a national question—not a Nationalist one, and the record of the members presently composing it has received national commendation and appreciation.

The advent of the New Year sees extraordinary interest evinced and attention directed to the furtherance of various canal projects for transportation purposes within the Dominion. Unfortunately, for the securing of a prompt and national benefit settlement, the promoters of each recognize in that of the others some sinister design and purpose. The enlargement of the Welland Canal, and the construction of what is known as the Georgian Bay Canal have, therefore, resolved themselves into two rival schemes. Both projects are within the sphere of a responsible government to determine and settle, and here again, tactful, resourceful and determined leadership fortified by unquestionably qualified expert opinion is demanded. Both canal projects are sure of consummation, but either one or the other has, meantime, to stand down, The Welland is the most urgent and the least costly, it is beset with fewer difficulties and contains all the elements of assured success; it, therefore, the present administration should apply itself unremittingly to carry through. The promoters of the Georgian Bay Canal can well afford to exercise a large measure of patience, and by doing this, they will reflect credit on themselves.

A death blow has apparently been dealt to the scheme for providing a Canadian navy, in so far at least as the building of the vessels on Canadian soil is concerned. We say, apparently, because of the hesitancy, utterly irresponsible and clearly evident signs of incompetency of those who have given utterance to its proclamation. The bugbears of Canada's sons being done to death in a naval battle and the fear of obsoleteness of her vessels ere they were built show in the first case of what stuff the objectors are made, and in the second, how little foresight, ingenuity and "savoir faire" constitute the birthright of our ruling politicians. A Canadian navy has in its essence more than a proposition of home defence or Imperial assistance, for it carries, if not the actual establishment of a new industry, at least the propagation and largely increased scope of that presently existing. We are in a position to know that keen disappointment has been felt on this score, and even if the late government erred by overlooking the feature of obsoleteness, that is no reason why their successors should adopt the suicidal policy of cutting adrift from the certain industrial effect realization. By all means let us aid the Imperial navy, but let us be farseeing enough, that while immediate considerations call for British built ships, to initiate and proceed with at once a comprehensive plan to, at no distant date, build largely our own naval and merchant vessels.

The marine side of Canada's development is the prominent issue before her people and Government to-day, and while in the past, to a large extent, we, as Sir William Van Horne once said, "have developed the hopper at the expense of the spout," there is every evidence that in addition to amplification and equipment of the "spout," a satisfactory "conveyor" system will soon connect the latter to the hopper.

Notable Personalities of Canada's Merchant Marine

The Part That Shipbuilding, Marine Engineering and Shipping Companies Have Played in Bringing Canada Prominently Before the Eyes of the Civilized World, Has Not, We Believe, Received That Credit of Performance Which is Its Due. We Hope in This Series Dealing With "Notable Personalities of Canada's Merchant Marine," to Show That Those Who Have Bridged The Trackless Ocean to our Shores, and Provided the Facilities for Our Disembarkation, Are Worthy of at Least a Sentimental Regard.

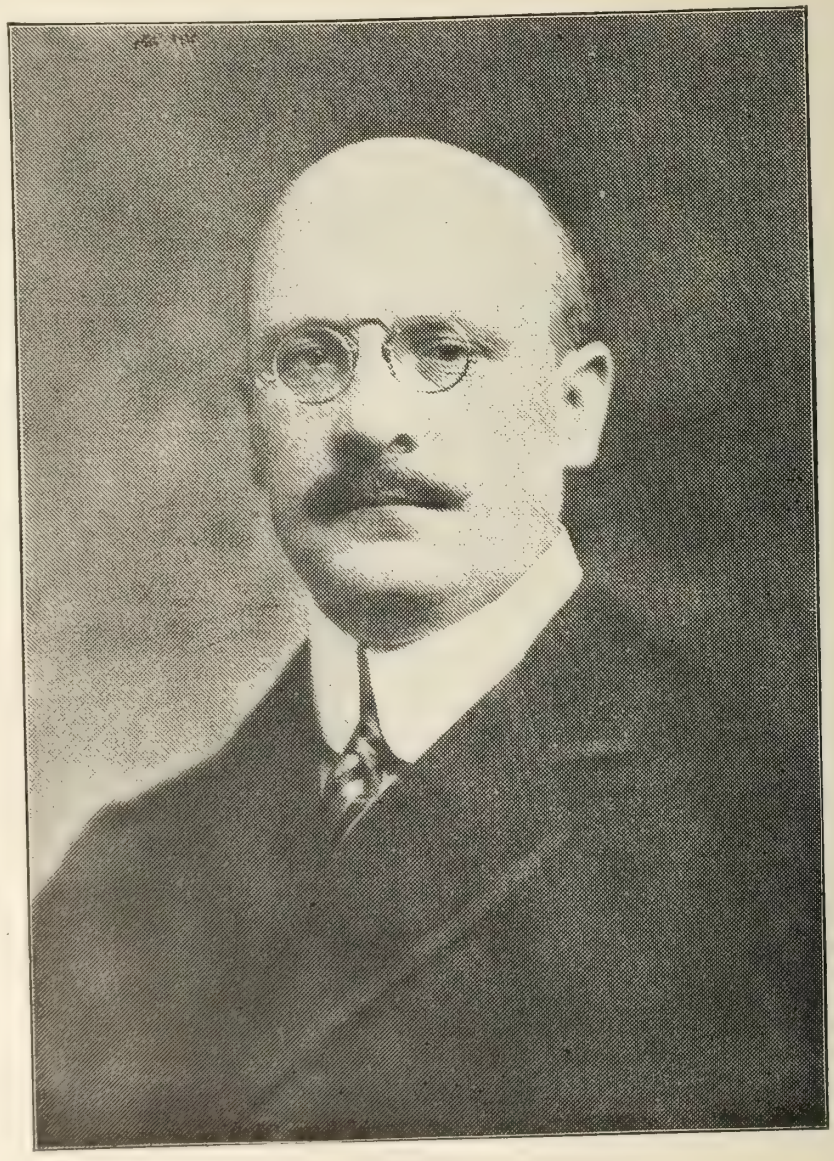
MAJOR GEORGE WASHINGTON STEPHENS.*

By L. G. Dennison, Montreal **

THE vast increase in the population and industry of the Dominion of Canada can be gauged by the growth of her commercial centres, an instance of which is the growth of her metropolitan city, Montreal. Its development is largely due to a unique natural location as a freight handling centre. But consider: Of what avail are natural advantages unless adequate terminal facilities are supplied, unless the ocean leviathans can find ample berth, unless their immense cargoes can be handled speedily, and unless we have citizens with the public interest at heart—citizens whose private means give leisure to devote to public undertakings, men who are keen of intellect, giants of industry and seers of visions. Among such men is Major George Washington Stephens, president of the Harbor Commissioners of Montreal, the pilot of that world-famous port, and the man who, with his colleagues has whirled the wheel with such effect that a few old shaky wooden piers have been replaced by a host of modern concrete wharves—lasting proof of his work—and who has wrought to such purpose that a myriad of smoky funnels attest the increased commerce for which he is responsible.

The subject of our sketch was born in Montreal, the eldest son of the late Hon. G. W. Stephens, a prominent Montreal lawyer and alderman, a member of the Quebec Legislative Assembly and of the Cabinet. Major Stephens' early educational training was received at the Montreal High School and McGill University. Opportunity was then given him of gaining broader knowledge and culture at universities in France, Germany and Switzerland. He commenced his business career with Steidtman & Co., being afterwards with J. & H. Taylor and the Thos. Robertson Co., for ten years he was administrator of the Stephens' Estate, representing the investment of millions, and is regarded as a leading figure in the commercial and financial world. Major Stephens was associated with several leading capitalists in gaining control of the Canadian Rubber Co., and when the rubber merger took place he became first vice-president of the Canadian Consolidated Rubber Co. To voice the high opinion in which Major Stephens is held in social and military circles is a task too difficult for expression, since he has been a well known figure for years.

His political service was characterized by the same thorough study and the same persevering energy that has marked his control of personal and harbor business. In the Legislative Assembly he devoted himself to educational improvement and is responsible for the erection of the new jail in Montreal. The public need in this direction was brought to his notice. His investigation and work for this reform included a visit to the jail, a night spent in one of its grimy cells, a graphic appeal to the public and to the government, with the result that an appropriation for a new building was secured. Major Stephens has written numerous able articles for newspaper and pamphlet publication,



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dealing principally with harbor conditions in Hamburg, Bremen, Rotterdam, Antwerp, Havre, London, Bristol, Southampton, Cardiff, Glasgow, Liverpool, etc., each replete with exact data, and showing a marked and thorough appreciation of the subjects treated. His recent pamphlet, "Marine Insurance Rates on the St. Lawrence" shows the aim of his most immediate endeavors.

The great development along Montreal's water front for which he must receive a large share of the credit, includes the installation of concrete piers, increased grain handling facilities, better channel lighting and buoying, more extensive railroad connections with the harbor, establishment of a floating drydock, the new freight sheds and a score of other minor but none the less important improvements. The carrying out of these works has increased Montreal's freight and passenger traffic to the extent that 200,000 people disembarked last summer from Europe, and that the customs receipts for the same period were nearly a million dollars greater than for 1910. Surely the part which such labor plays in the upbuilding of our Dominion is beyond estimate. It is an important factor in securing the cheapest, shortest and safest trade route to and from this continent, and those men with keen appreciation of commerce conditions who have conceived and executed such developments are well worthy of national tribute.

TENDERS, CHARTERS, CONTRACTS

Port Arthur, Ont.—Tenders will soon be invited for the new boat of the Northern Navigation Company, according to Mr. James Playfair, president of the company, who left for Toronto after spending a couple of days in Port Arthur. Mr. Playfair said that a delay had been occasioned in calling for these tenders owing to some difficulty having arisen in coming to a decision as to the actual style of boat required. "We are not going to lengthen the Huronic this winter," said Mr. Playfair, "though a little while ago that was the intention. We find it impossible to do so now and get her ready for the spring service, when we expect the traffic to be so heavy as to demand the use of all our equipment on the Great Lakes. Originally, we intended to cut the Huronic in half, build 50 feet of new boat amidships and then put the two ends on again, but beyond some repair work to her keel and other minor jobs we shall not do much to the Huronic this winter."

Vancouver, B. C.—Messrs. Dodwell & Co. announce the charter of the British steamship Cape Breton, to load here toward the end of January for ports in the Orient. Large demand for cargo space aboard Orient-bound liners is responsible for the chartering of extra steamers to augment the regular monthly sailings of the Blue Funnel liners. The Cape Breton, now in Oriental waters, being due at Otaru, Japan, from Shanghai, is well known in this service. She was built in 1904, is 369 feet long, of 49 feet beam and has a depth of 17.5 feet, with a net tonnage of 2,501 tons. She will load general cargo in Vancouver, afterwards shifting to Tacoma, where big shipments of cotton will be taken aboard, when a return trip will be made to this port for the purpose of loading lumber. This charter is the sixth that Dodwell & Co. have announced within the past two months, the other steamers being the Robert Dollar, Harlesden, Skerries, Henley and Willesden. The Willesden sailed recently for ports on Puget Sound, and will return here to complete prior to clearing for the Orient.

St. John, N.B.—The Maritime Dredging and Construction Co. has been granted incorporation with a capital of $100,000 and head office in St. John, N.B. The company, consisting of M. W. Doherty, G. H. Dean, Robert Seeley, Thomas Bell and Fred C. McNeil, all of that city, is given power to carry on a general dredging and construction business.

St. John, N. B.—The machinery for the new steamer, which is being constructed for Captain Taylor to run on the St. John river suburban route, is getting well under way. It is being made by J. Fred Williamson, who stated that he would be ready to install it when the hull arrived down river in the spring. Mr. Williamson is also fitting up a new steam yacht, 45 feet long and 8 foot beam. In this yacht he is installing a triple expansion engine.

Vancouver, B. C.—The contract for the extension of the Union Steamship Company's dock was recently awarded to O'Brien, McCaughey & Lemcke, of Seattle. The pier is to be extended about 200 feet seawards and the work on the extension will go on without delay in order that the structure may be completed by March 1. The contract specially states that labor must be employed locally, and with the exception of the creosoted piling, all the material to be used in the construction of the dock must be purchased in Vancouver. The contract for the shore-end improvements has been let to Ironsides, Rannie & Campbell, and the new office building will be erected by J. McNee.

The British Columbia Marine Railway recently concluded contracts for 4 steam vessels for the Pacific Coast trade out of Victoria, B.C. One is to the order of the C.P.R. for their service on the west side of Vancouver Island, while the identity of the owners of the others has not, meantime, been made public. The outlook for a particularly busy year on the sunset coast is in every respect highly promising.

NEW BID FOR SHIP PLANT.

Although it is understood that an examination was being made of the Collingwood shipbuilding plant upon behalf of Sir Rodolphe Forget and the Richelieu & Ontario Navigation Co., negotiations for purchase by other interests are said to have been begun. The option to purchase held by the Northern Navigation Company has, we understand, expired, or will expire shortly, and it is said that another large corporation is prepared to make an offer. The object in both cases is to make the works at Collingwood an auxiliary to a lake navigation service.

THE STEAMSHIP IMPERATOR

The Hamburg-Amerika Co.'s steamship Imperator, photo of which, as she will appear when completed, is shown on page 1 of the present issue, eclipses, in size, every other Atlantic liner. Her length is 880 feet, her breadth 97 feet, her depth 64 feet, and her gross tonnage 52,000. Accommodation is being provided on board for 5,275 persons, made up of 800 first class, 600 second class, 975 third class and 1,800 steerage passengers, together with a crew of 1,100. Needless to say, the equipment of the first class quarters will consist of the most magnificent and luxurious furnishings and conveniences that ingenuity and art can devise. The Imperator is rapidly approaching completion, and it is confidently expected that she will be on her station in a few months' time.—J.C.

NEWS OF THE TERRA NOVA.

Sir Edgar Speyer, the treasurer of the British Antarctic Expedition, has received the following message, dated Christchurch, December 15, from Mr. J. J. Kinsey, the New Zealand agent of the expedition:—"Please inform friends that Terra Nova sailed this morning from port of Lyttelton. Equipment, stores, quite satisfactory; animals in good condition; everybody aboard excellent form." The message indicates that the Terra Nova has sailed for the Antarctic to bring back Captain Scott and the members of the expedition should they have achieved their mission. She is expected to return to Lyttelton in the middle of March.

Great Britain's Part in Building Canadian Steam Ships

By the Editor

Being the Fourth of a Series of Short Illustrated Articles Descriptive of Steamships Recently Built and Presently Building in Great Britain and Ireland for the Canadian Merchant and Passenger Trade—From the Details Given, It Will Be Seen That the Latest Fully Proved Developments in Shipbuilding and Marine Engineering are Being Adopted by Those Responsible for the Steamship Service to and From and Within the Dominion.

THE R. & O. STEAMSHIP "SAGUENAY."

THE steamer Saguenay, herewith described and illustrated, was built by the Fairfield Shipbuilding and Engineering Co., Glasgow, Scotland, to the order of the Richelieu & Ontario Navigation Co., Montreal, Canada. She is the first of the latter company's fleet to be built in Great Britain.

Vessel Features.

To suit the particular conditions of service, the general dimensions and lay-out of the vessel were specially designed and arranged. Her length is 275 feet, her breadth 54 feet 6 inches, and her height to the hurricane deck, 40 feet. She has five decks:—Orlop, main, promenade, gallery and hurricane. On the orlop deck, accommodation has been provided for 76 members of a crew, while on the promenade and gallery decks, 240 first-class passengers have sleeping accommodation, distributed for the most part in two-berth cabins. On the main deck there is large space for freight, or alternatively for the accommodation of other passengers, while two rooms are provided for a few second-class passengers, the gentlemen being accommodated on the port, and the ladies on the starboard side. Special provision has also been made forward on this deck for the carriage of horses or cattle. Abaft of the engine-room, on the orlop deck, are the petty officers' and crews' messrooms. Still further aft is the kitchen, the ventilation from which passes up in a shaft through the dining saloon above and the cabins, right to the top of the ship.

On the main deck are located the baggage check room, the chief steward's and purser's offices, and at the extreme after end, the dining saloon. This latter is reached from a large entrance hall and companionway from the deck above. The dining saloon is panelled in mahogany and has seating accommodation for 100 passengers. The service to and from the kitchen and pantry below is accomplished by means of a hoist, the complete equipment comparing favorably with many large and more pretentious liners.

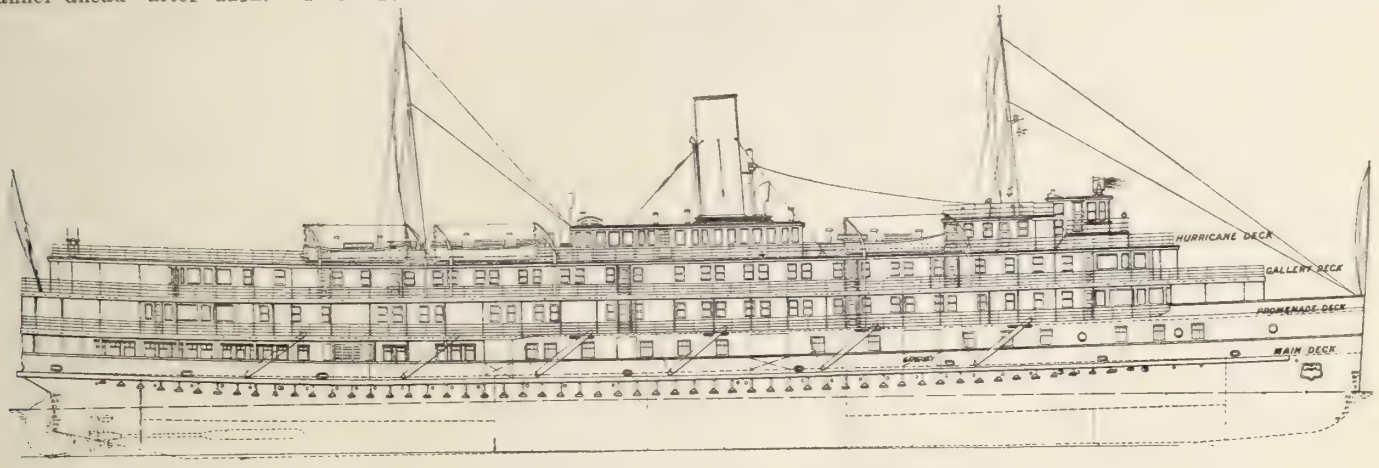
The passage-ways from which access is got to the cabins on the gallery and promenade deck are wide promenade spaces. In the gallery-deck there is a large well forward and another aft, giving light and ventilation to the deck below, and around it is the gallery from which the deck takes its name. This gallery, like that forward, is lighted by sky-lights piercing the hurricane-deck above. At the forward and after end of the promenade-decks there are observation turrets, which constitute a feature of the ship. Those on the promenade deck are circular, while the two on the gallery deck are elliptical, so that the deck structures in the latter case should be of less length than that of the promenade deck. On the promenade deck are special suites of state rooms with parlors, while placed at convenient points are various lavatories, bathrooms, etc.

The hurricane deck is given up entirely for navigation purposes, although pas-



The Richelieu & Ontario Navigation Co. Steamship "Saguenay."

sengers may promenade or lounge in deck chairs, the only obstruction being the boats. In the centre of the deck, around the boiler and engine room uptakes, is an observation cabin, where passengers may sit under shelter. At the forward end are the rooms for the navigating staff, with a pilot house at the forward end. This has a semicircular front, with platform, so that passengers may view the scenery. The navigation of the ship is conducted from the top of the pilot-house, where the compass is placed, and where also there is a searchlight for the discovery of buoys at the end of the journey, and for lighting the channel ahead after dark. Two steel masts and the funnel contribute, with the flagstaffs fore and aft, to give the vessel a smart, attractive appearance.



The Richelieu & Ontario Navigation Co. Steamship "Saguenay."

Machinery Equipment.

The propelling machinery consists of two sets of 4-cylinder, 4-crank triple expansion engines, balanced on the Yarrow-Schlick-Tweedy system. The engines were designed to indicate 2,100 horsepower, when running 180 revolutions per minute, and during the vessel's trials on the Clyde previous to sailing for the St. Lawrence, a speed of 16 knots per hour was obtained. The propellers are of the built type, the blades being of bronze. The starting platform is located on the main deck, and is arranged so that the operation of the engines, etc., is under convenient control. Three boilers with a working pressure of 175 pounds per square inch, and fitted with Howden's system of forced draft, supply steam to the main and auxiliary machinery, the latter of which includes the powerful dynamo engines and a refrigerating machine. A complete steam heating equipment is installed throughout the ship, and elaborate precautions have been taken to ensure ample fire protection.

The design and construction of the vessel was carried out under the personal supervision of Mr. A. Angstrom, consulting naval architect, for the owners, and the success that has attended his efforts is borne out by her services during the past season.

NAVAL ACTIVITY ON THE CLYDE.

There has been abnormal activity in the shipyards in the Clyde district. This has been due, in large measure, to the abundance of the work on hand for the British Government. The insistent demand for more capital ships, which succeeded the pessimistic utterances of Cabinet Ministers over two years ago, has produced much good work, and the exceedingly prosperous condition of the shipbuilding industry on the Clyde is due in no small degree to that agitation. During the period when pacific proposals were being made to the German Government regarding limitation of armaments, the shipbuilding programme of Great Britain was reduced to its lowest level. The results were dire in the extreme to the thousands of workmen who find employment in the great naval construction works on the river. Although the resources of the British taxpayer may be strained to meet the enormous increase in naval expenditure, the increased prosperity of the communities dependent on shipbuilding repays, to some extent, the outlay thus demanded. There are probably over 20,000 men engaged at present in Admiralty work in Clyde yards, and many more thousands are employed in the great steel works, armor-plate works, ordnance works, and by the many sub-contractors attending to the details, and the special parts necessary for the completion of the various vessels.

THE HAWKE-OLYMPIC COLLISION.

THE Admiralty Court, in giving judgment, finds that the White Star Line steamship Olympic was responsible for the collision with the British protected cruiser Hawke near Osborne Bay, Isle of Wight, on September 20 last. While the judgment of the Court finds against the owners of the Olympic on all the points raised at the trial and the decision is given for Commander William F. Blunt, of the Hawke, with costs in the suit brought against him by the owners of the liner, the cross suit, brought by the Admiralty against the owners of the Olympic, failed on the defence raised by them of compulsory piloting. The liner was in charge of a pilot at the time of the collision, this being compulsory on all vessels sailing along that part of the British coast. In the cross-suit brought by the Admiralty, each side has to pay its own costs, and the effect of the decision is that neither side is mulcted in damages.

Sir Samuel Thomas Evans, President of the Probate, Divorce and Admiralty Division of the High Court of Justice, who gave judgment, accepted the theory of suction advanced by the commander of the Hawke, and expressed himself as satisfied that the Hawke did not starboard her helm as alleged; the cause of the collision being that the liner came too close to the cruiser. He also decided that the place of the collision as given by the Hawke's witnesses was correct, that the speed of the Olympic at the time of the collision and for a few minutes preceding it was greater than had been stated by her witnesses, and that the Hawke's speed at the time of the collision and for some time before was about fifteen knots.

The Olympic's course, the judgment continues, was farther south than had been stated in evidence, while the Hawke's course was such as had been stated by Commander Blunt. The explanation of the Olympic's position was that she took too wide a sweep around the west Bramble buoy. The evidence had established the fact that the vessels were never on parallel courses. He thought that the Olympic, having the Hawke on her starboard side, ought to have got out of the latter's way. The Hawke was never the overtaking vessel. If either vessel was overtaking the other it was the Olympic. They, however, were really crossing each other's course and the collision was solely due to the faulty navigation of the Olympic's pilot.

READERS' NOTES AND VIEWPOINT

Devoted to Brief Article Contributions Covering Experiences, Correspondence and Comment on Matters Marine. We Pay for Suitable Material.

ELECTRICAL MACHINERY, ITS CARE AND HANDLING.

By Roderick Grant, Toronto.

IF we leave out of account faults in design, material or construction, breakdowns of electrical machinery may almost invariably be traced to want of attention, and in most cases the trouble starts at the brushes or commutator. It is essential, therefore, that frequent periodical inspection be made, and that all parts be kept scrupulously clean, for faults arising through neglect in this direction develop rapidly, and sooner or later burnt out coils are sure to result. It is our purpose, here, to point out the general precautions to be observed by engineers and attendants in charge of electrical plants

Brushes and the Troubles Arising Therefrom.

Where a number of d.c. motors are in constant service, it is advisable to have at hand a spare set of brushes of the required size for each machine. The common practice of cutting a brush when required from a large sheet of carbon is not recommended, for in addition to the obvious risk of time being lost while the brush is being fitted, there are other disadvantages to be accounted. It will be found that separately molded brushes have a more even texture and are more free from imperfections such as cracks. It is also possible to have them copper coated, which, not only reduces the resistance, but makes better contact with the holder, thus reducing any tendency to excessive heating. In some brushes, a certain percentage of graphite in their composition reduces the mechanical friction on the commutator. It is essential that the brush should be an exact fit for the holder, as otherwise the area of the surface in contact will be diminished, causing undue heating, and if the holder is of the box type, chattering with sparking is sure to result.

When inserting the brush, the machine, if possible, should be out of gear, with the armature free to revolve. A strip of coarse sandpaper should then be placed under the brush, face upwards, and held close around the surface of the commutator. While the brush is bearing with the normal pressure of the spring on the effective side of the sandpaper, the armature should be moved backwards and forwards until a convex surface is ground in the face of the brush that will bear truly on the commutator surface. The process should then be repeated with a strip of very fine sandpaper to give a smoother finish, and finally all dust should be carefully removed. Emery cloth should on no account be used in the operation, for the particles, which are conductors, are liable to lodge themselves either in the carbon or between the segments in such manner that it is almost impossible to remove them, so that cutting of the commutator or short circuits between the segments are likely to ensue.

It is very important that the pressure of the brushes should be carefully adjusted, and by means of a small spring balance this can be accurately performed. It will be found in practice that a pressure of 4 lbs. per square inch will generally give satisfactory results. If the pressure is too great, there will be needless wear both of brushes and commutator, and also undue heating. If too light, sparking will, of course, result. An effort is being made on modern machines to design the brush gear in such manner, that without special precaution being observed, the brushes may be readily set and maintained at the correct position. This object has been more nearly accomplished where the holding device allows the face of the brush to bear straight on the commutator and not at an angle, and the device has a further obvious advantage, when a machine has to reverse its direction of motion.

In many of the older machines, and in some modern machines, where the brushes bear at an angle, special care should be exercised to set and maintain them at the proper position, for if we look upon the diametrically opposite bars of a commutator as the ends of a circuit that is closed by the brushes, it can be readily foreseen where the current would arc, if even one brush were out of its true position. It is also necessary, in order to obtain sparkless commutation with a dynamo or motor, that the brushes be set at the neutral point on the commutator : at the point where the armature conductors are moving parallel to the lines of force set up by the field magnets, and where consequently, there is no generation of current. On most machines this point is clearly indicated, and the position of the brushes has not to be changed with a variation in load. On some machines, however, the point can only be determined by moving the rocker until a position is found where sparking ceases. It may also be necessary to change that position with any variation in load. Thus, in the case of a dynamo, it may be necessary to move the brushes in the direction of rotation of the armature with an increasing load, and in the opposite direction with a decreasing load. With a motor, the procedure is reversed.

Commutator Troubles.

Provided, first, that the brushes are set properly ; second, that the precautions as to cleanliness have been observed ; third, that the commutator is perfectly smooth, that there are no high or low bars, or high or low mica; fourth, if the machine has not become in anyway overloaded, which trouble will reveal itself in abnormal heating of the armature, it may be concluded that any other trouble arising is due to a fault in the armature or fields, and as special facilities are, as a rule, necessary to localize it, we will not, meantime, go into the matter. A careful examination, however, is often all that is necessary to reveal the cause. It will sometimes happen that the segments of a commutator will wear down unevenly, owing to the fact that the copper is not all of the same degree of hardness. If this trouble developes, the armature should be removed, and the commutator turned down in a lathe.

A more frequent and also a more troublesome state of affairs is a condition of commutator caused by high mica. Mica best answers all requirements for the insulation of a commutator, and is almost entirely used, but makers find difficulty in securing a uniform degree of hardness. Consequently we sometimes find that the mica projects from the commutator surface. This projection may be so slight that it cannot be felt by the finger, but may be readily appreciated by resting the point of a knife on the revolving commutator, while the other end rests lightly on the fingers

Now, it is of the utmost importance, especially with high speed machines, to have the commutator absolutely smooth, otherwise the brush will break contact for an instant in passing a high point, and cause more or less sparking. Turning down the commutator in this case will do no permanent good, as the trouble would soon start again to develop. It is claimed that slightly grooving out the mica between the bars is both a preventative and a cure, and further, that the centrifugal force will effectually prevent any particles from lodging in the groove. Should resort be made to this plan, no vaseline or lubricant of

any kind should be used on the commutator, while under any conditions. they should only be applied sparingly.

PACKING POINTERS.

A BABBITT metal or brass ring in the bottom of the box of an outside packed plunger, is a great aid to packing. It will pay for itself many times over, not only in cost of packing, but also in the general neatness and cleanliness around the pump. When using packing with high pressure or superheated steam, it is not advisable to use cylinder oil as a regular lubricant. A mixture of cylinder oil and graphite is good, the cylinder oil simply serving to help flow the graphite into position. The graphite gradually fills in the smaller pores of the rod and levels them up, making a smooth surface. The smoother the surface, the less friction there will be between the rod and the packing. Some engineers make a quick and permanent joint out of a self-vulcanized packing by turning on three or four pounds of steam after the joint is made, and when the joint is thoroughly warmed, dashing a few buckets of water over it, thus cooling the flange and the packing. This causes the latter to harden into position at once. It is a quicker process than that of self-cooling.

Packing if treated right will do a great deal of good honest labor for its master; but if forced, it balks and will not work. A man should be patient with packing, and use it very carefully until it thoroughly conforms to the shape of the box. If it be given plenty of room and be well lubricated, it will last for years; but if squeezed into a confined space and run dry, it will soon lose its life. It is a good plan for the engineer to keep a little note book in which he has tabulated the diameter of every rod, the diameter and depth of its stuffing box, and the size of the packing required. This enables him to make out an order quickly, and at the same time with certainty. The measurement of a rod in motion is always guess work. It is also a good plan to number each box, and keep extra packings on shelves in the order of these numbers, so that location be made quickly in case of emergency. A good engineer can pack with almost anything. A poor engineer can spoil the best of packing. An engineer, who treats carefully the packing which he puts in and takes care of it as he would a new suit of clothes, will find that it will stand by him and give good service.

If he abuses it, particularly with the unwise use of a wrench, he will find that it will wear out very quickly. "Patience" and "carefulness" are the watchwords of success with packing.

Before inserting a packing ring, it should always be dipped in cylinder oil. The advantage thus obtained more than compensates for the corrosive effect of the oil. The oil as a lubricant, prevents excessive friction and allows the packing to place itself in position without being burned; and while the oil will affect the rubber, it will not produce as quick and disastrous an effect as the excessive heat, which would occur if no lubricant were used. Some engineers make a practice of placing sheet packing in position on a flange and then cutting the edges with a hammer. This is a very poor system, as it leaves a bruised and ragged edge on the rubber which has a tendency to tear. The best way of cutting is to first mark the outline of the gasket on the sheet and then to cut with a sharp knife. This leaves a clean cut edge and lessens the danger of a blow-out.

When drawing up a gasket draw the bolts up gradually and on all sides, so that the two flanges approach each other as nearly parallel as possible. If drawn up tighter on one side to begin with, the gasket is distorted and probability of blowing out is almost assured. If there are eight bolts in the flange, draw number 1 partly, then skip to number 5, then to number 7, then to number 3, and then to the intermediate bolts. Repeat the same process, drawing them a little tighter each time.

VANCOUVER'S SHIPPING.

Great additions are expected shortly to be made in the tonnage trading to Vancouver. There are now under construction, or ordered, vessels aggregating 100,000 registered tons. The new C.P.R. liners, the Empress of Asia and the Empress of Russia, which will be added about twelve months hence to the trans-Pacific service of the company, are of approximately 15,000 tons register. The new Canadian-Australian liner, being built for the Union Steamship Co., will be of 13,500 tons The Talthybius, launched on November 9 for the Blue Funnel line, is a vessel of over 13,000 tons and another vessel of the same type is soon to be added

The Harrison Direct line, which inaugurated a service to Vancouver in May, in order to be first in the field for the traffic which the Panama Canal will develop, is building three large steamers, the Actor, the Sculptor, and another not yet named. The Kosmos line has four steamers of 12,000 tons register under construction or on order. The Swedish-Johnson line, a Christiana firm which has announced its intention of entering the service as soon as the Panama Canal is constructed, has ordered four steamers of 8,000 tons register from British builders. The Holland-Amerika line of Rotterdam, which also intends competing for Pacific Coast trade, has ordered for its fleet two additional steamers of 18,000 tons each.

The steamer Inkula of the Gulf Transport line is being sent to this port by J. H. Welsford. She is the first of three steamers for the Canadian-Mexican line, with the stated intention of continuing the service through the Panama Canal. The Leyland, Royal Mail, Steam Packet, and other lines, now trading to the Gulf of Mexico, are reported to have plans for sending vessels through the canal to the North Pacific.

MOTOR BOATS IN GREAT BRITAIN.

THE large full-powered motor yacht and the sea-going commercial launch have come greatly into favor recently. In the south a few speedy vessels of outstanding importance have been turned out, but in Scotland the cruising boat alone has commanded attention. There has not been a large increase in the number of oil-engined boats over that of previous years, but in the size of the vessels there is a marked advance. This shows the growing confidence in the internal combustion engine for hard service afloat. In past years, the popular motor cruiser has been a launch of from 25 ft. to 35 ft., the large cruiser of from 60 ft. to 80 ft. being uncommon. Now, however, the full-powered coasting craft is in demand, with the result that there has been produced during the year about a dozen large, seagoing, coasting yachts of high power. Of commercial vessels there has been built an increased number of motor-driven fishing craft, harbor service launches, barges, and tow boats, and also of pinnaces for the mercantile marine.

The development of the marine motor has been in the direction of paraffin and crude oil. Petrol is now favored in home waters only for the smaller class of pleasure launches. The solid injection crude-oil engines of the Bolinders type are favored by owners of commercial craft for powers up to 150 b.h.p. For engines of 100 to 350 b.h.p. the semi-Diesel is being turned out in increased numbers. Many crude-oil engines of the solid injection and semi-Diesel type have been supplied to canal barges and small coasters, and the demand has increased so much as to warrant the manufacture of engines of the former class as low as 15 b.h.p. There has been an increasing demand for the heavy type of single-cylinder paraffin engines of 5 b.h.p. to 10 b.h.p. for fishing boats and commercial launches.

MARINE NEWS FROM EVERY SOURCE

Forming a Concise Record of What is Being Done and Happening at Home and Abroad, and Providing a Means Whereby Readers are Kept in Intimate Touch with Marine Progress, Development, Etc.

Canada

Kingston, Ont.—At the recent annual meeting of the Kingston Shipbuilding Co., Mr. S. Dyment of Barrie, was re-elected president, and Mr. W. J. Fair of Kingston, was re-elected secretary-treasurer. All the directors were also re-elected. Satisfaction was expressed with the amount of work at the dock and yard during the year, and prospects are already in evidence to ensure enough work ahead for another twelve months in the way of shipbuilding.

Collingwood, Ont.—Capt. James Wilson, of the Empress of Fort William; Capt. A. M. Wright and his first officer, Mr. J. D. Montgomery, of the N. N. Co.'s steamer Saronic; Capt. John Moles, of the Newona, and Capt. J. N. Foote, of the Turret Crown, have arrived home; their vessels being laid up for the winter.

Collingwood, Ont.—The N. N. Co.'s steamer Huronic, Capt. A. L. Campbell, will probably be lengthened during the ensuing winter at the yards of the Collingwood Shipbuilding Co.

Midland, Ont. — The tug Maud D., owned by Playfair, Preston & Co., was burned at Midland recently.

Owen Sound, Ont.—The harbor has assumed a winter appearance. The C.P.R. boats are all tied up in their usual locations. The Alberta and Manitoba are lying bow to bow at No. 1 shed, the Assiniboia and Athabasca will be tied up further along the dock. The carrier steamer, G. R. Crowe, is lying down in the slip, and is booked to winter here. The semi-whaleback, Turret Crown, is tied up at McLachlan's dock on the west side, while just opposite are the D. T. Co.'s boats Manitou and Caribou. This completes the tally of larger craft. Down nearer Tenth street bridge the big tugs Harrison and Keenan are berthed on the east side, while on the opposite side are the tugs Minnie A. Clark, Cynthia, Sea King, Evelyn and C. Lucas, with the steam yacht Venetta. The season has been most successful for all the vessels sailing from Owen Sound, none of them having met with any serious mishap.

Port Stanley, Ont. — A floating drydock will be built in Port Stanley by Mr. Oscar C. Smith, to provide facilities for the repair of vessels coming into port, as well as to care for the local [illegible]

Montreal, P. Q. — Plans for further improvements to the harbor of Montreal during the season of 1912, have been forwarded to the Minister of Marine by the Harbor Commissioners of Montreal. These plans call for the erection of a sufficient number of new piers to provide fourteen new berths for ocean-going vessels. They will be of the high level type and made of concrete. On each will be a spacious fire-proof shed of reinforced concrete. Another feature of the plan is the widening of the channel and lessening of the force of St. Mary's current. It is proposed to increase the width of the channel from 600 to 1,200 feet, thus doubling its size and making for an improvement long desired by the navigation companies. The lessening of St. Mary's current will be carried out by a system of dredging, the geological formation permitting of this to be done without great difficulty.

Ottawa, Ont.—A strong case for immediate action by the government towards the enlargement of the Welland Canal, in accordance with the plans of the late government, was made out by a large and representative deputation from the Associated Boards of Trade of Ontario. The deputation was headed by the president of the Associated Boards of Trade, who presented to Premier Borden and his ministers a memorial summarizing the arguments in support of the project. The following arguments were advanced in support of the scheme:—The project has already been strongly endorsed by boards of trade and municipalities representing nearly all the important centres of Ontario. An enlarged Welland Canal will reduce rates on grain shipments from the West, and will be a great leveller of freight rates generally. It will settle the transportation question finally in Canada's favor. It will reduce the through rate from Fort William to Montreal, and will enormously enhance the value of the western crop. The approaching completion of the Erie canal enlargement makes a larger Welland Canal immediately imperative, unless traffic is to be diverted via Buffalo. The time of transit between Lakes Erie and Ontario would be reduced from eighteen to six hours.

Halifax, N. S. — In the Admiralty Court, Mr. Justice Drysdale gave judgment in the S.S. Berwindmoor salvage case, awarding $12,500 to the S.S. Energy ($10,500 for the ship and $2,000 for the captain and crew) and $600 to the cable steamer Mackay-Bennett ($500 for the ship and $100 for the captain.) This is probably the most speedily tried case ever heard in the Admiralty Court here. It started as a preliminary hearing and merged into the complete trial, the evidence of many witnesses being heard.

Halifax, N. S. — The coasting steamer Avon, belonging to the Peninsular Steamship Co., sank at her pier recently. The cook, who was asleep below, had barely time to spring to the wharf, wearing nothing but his night-clothes.

Victoria, B. C. — The secretary of the local branch of the National Association of Marine Engineers of Canada, wrote to the city council recently, protesting that the contractor (Capt. Gardiner) for the towing of garbage scows to sea from the city wharf, was employing a Japanese engineer, and expressing the hope that white labor would be protected when a new contract was let. The contractor's explanation was that he could not obtain a white engineer, but the association contended that the hours of service and wages were not sufficient to encourage white help. Ald. Okell said there was a clause in the contract protecting white labor, but the captain replied that he had two tugs, one of which was used for city work, and the other for private jobs. On the latter, the Japanese engineer was employed, and therefore he considered that the council had no power to interfere.

Victoria, B. C.—The steamer Venture of the Boscowitz Steamship Co. is to be equipped for burning oil fuel. The steamer Camosun of the Union Steamship Co., which is operated in connection with the local steamer on the northern B.C. coast route, is also to be similarly fitted.

Fraser Mills, B. C.—Three steamers are now under construction at Fraser Mills, for service, on the Skeena River and Soda Creek. The frames are cut-out in the mill yard, shipped north by train over the completed portion of the Grand Trunk Pacific, and then freighted by team to their inland destination. One steamer which is being built for the B. C. Express Co., will be 118 feet in length, 25 feet beam, and will have a speed of 14 miles per hour. She will ply between Tete Juane Cache and Fort George, a distance of 350 miles. The new steamers will be of stern-wheel model.

Two stern-wheelers are also being built for the Grand Trunk Pacific Railway, to be used in the vicinity of Fort George. Both steamers will be 140 feet in length, with a carrying capacity of 250 tons each. Two large barges with a capacity of 500 tons each are

also being laid out. The frames being freighted in and then assembled. The engines and boilers of the steamers Conveyor and Operator now being dismantled at Victoria, will be installed in the new hulls.

Ottawa, Ont.—The first report of the Department of Naval Service shows an expenditure of $1,790,000 out of an appropriation of $3,000,000. On the fisheries protection service there was expended $272,200, out of an appropriation of $301,500. Upon the hydrographic surveys, out of an appropriation of $300,000 was expended $163,118. The total appropriation of $150,000 for wireless stations was spent. Arrangements are in progress for the establishment of a chain of wireless stations on the lakes from Port Arthur to Kingston, including Port Arthur, Sault Ste. Marie, Midland, Tobermory, Sarnia, Port Stanley, Port Colborne, Toronto and Kingston, with the station at Kingston of sufficient range to communicate with Montreal.

Wheatley, Ont. — The Harbor Committee are making arrangements for the building of a new pier at Two Creeks. Work will be commenced as soon as possible.

Fort William, Ont.—A concert was given at the Sailors' Institute as a send off to the crews of vessels in port before leaving for their homes, the season for navigation being closed. Mr. I. L. Matthews presided, and the success of the entertainers was amply proved by the rounds of applause with which each number was greeted. Among the ladies and gentlemen who contributed to the program were Miss Hawkins, Miss Whittock, Mr. Eaglesome, Mrs. MacFarlane, Miss Scott, Miss Bennett, Mr. Kaufman and Mr. Robert Stery.

Ottawa, Ont.—The Canadian Government will, during the coming summer, entertain the delegates to the International Marine Association Conference, Philadelphia. Representatives of the leading marine interests of the world will attend the conference, and when it adjourns the members will make a tour of the great lakes and St. Lawrence waterways as guests of the Canadian Government, visiting Fort William, Owen Sound, Toronto, Kingston and Montreal. An appropriation of $20,000 will be placed in the estimates for the coming year to defray the cost of the trip through Canadian waters.

Vancouver, B. C.—It is reported that Sir Donald Mann definitely announced the inauguration in the near future of a C.N.R. steamer service between Canada, Australia, and China, as well as a Western Canada grain service to Europe, via Vancouver and the Panama Canal, as soon as that undertaking is completed. A line of steamers is already carrying grain to Europe for the C.N.R., and it is proposed to build a number of large freighters which will take all the grain shipped from Saskatchewan and Alberta to Europe.

Victoria, B. C.—The Dollar Steamship Lines, Ltd., a new steamship company with registered office at R. P. Rithet & Co.'s offices on Wharf street, is being incorporated to take over the Stanley Dollar Steamship Co., M. S. Dollar Steamship Co., and Hazel Dollar Steamship Co., which are being wound up. The Dollar Steamship Lines, Ltd., will take over the Hazel Dollar, M. S. Dollar and Stanley Dollar, which steamers are now registered at the port of Victoria, and will also include the new steamer Robert Dollar, recently built at Glasgow for the transpacific freight service of the Dollar Line. The Robert Dollar, which is now registered at Glasgow, will probably have her register transferred to Victoria.

General

A Lonely Occupation.—Six thousand five hundred square miles, chiefly of bogland, pasture and morass, cut through by brownish tarns ; a bleak climate like most of the outer Hebrides ; rain on 250 days in the year, leaden skies nearly always, a little Capital called Stanley with some 600 inhabitants and three places of worship ; such is to be the lot of the electrical engineering staff who man the new 5 k.w. Marconi station at the Falkland Islands. The working range will be 400 nautical miles over water, with a maximum considerably in excess of this. The Crown Agents for the Colonies gave out the order, and some importance attaches to this new move, as the radius will embrace an area in which navigation was much at a loss for means of communication.

New Vessel Order. — The Toledo Shipbuilding Co. has booked an order for a passenger steamer, for delivery next season, to cost about $100,000, for the Thousand Island Steamboat Co., St. Lawrence River trade. The boat will be 175 feet long, 32 feet beam, and 9 feet 9 inches moulded depth. She will have accommodation for about 1,000 passengers, and will make sixteen miles an hour. Work on the new boat will be started at once, and she will be completed and ready for business by June 1st, 1912.

Japan. — The shipbuilding industry of Nagasaki, Japan, has improved very much in the last year. A contract has

STEAM VESSELS REMOVED FROM THE CANADIAN REGISTER, NOVEMBER, 1911.

Official No.	Name of ship.	Port of Registry.	Net Tonnage.	Cause assigned.	Date of loss
100,186	Active	Montreal.....	190	Broken up	
.....	Advance	Kingston.....	14	Broken up	
80,771	Alfred Wilson	Sarnia.....	22	Out of existence..	
88,527	Brace	Hamilton.....	6	Out of existence..	
59,803	Clyde	Quebec.....	373	Broken up	
90,878	Electra	Charlottetown.....	78	Wrecked	Oct. 25, 1911.
72,561	Flight	Kingston.....	27	Out of existence...	
.....	Frances	Kingston.....	24	Out of existence...	
51,087	H. M. Mixer..	Kingston.....	9	Broken up	
90,549	Houghton ...	Montreal.....	24	Broken up	
66,033	James	Quebec.....	31	Broken up	
78,041	Lorne	Quebec.....	4	Broken up	
126,081	Noname	Vancouver.....	77	Sunk in collision..	Oct. 22, 1911.
122,388	Sunburst	Victoria.....	19	Burnt	Aug. 24, 1909.
	14 Vessels		898		

STEAM VESSELS REGISTERED IN CANADA, NOVEMBER, 1911.

Official No.	Name of Ship	Port of Registry	When and where built	Length	Breadth	Depth	Gross tonnage	Regd. tonnage	Engine H.P.	Owner or Managing Owner.
*130,757	Gunhild.....	Vancouver.....	1906 Quartermaster Hart U.S.A.	61.0	12.7	5.1	27	18	10½	Carl V. Ericsson, Vancouver, B.C.
130.794	Jericho.....	Vancouver.....	1911 N. Vancouver, B.C..	67.0	14.5	4.4	44	30	8	Arthur G. Balkwill, Vancouver, B.C.
130.758	John H. Sprott..	Vancouver.....	1911 Vancouver, B.C.....	53.3	27.5	4.9	110	75	5	Minister of Public Works, B.C.
130.759	Leonard M.....	Vancouver.....	1911 Vancouver, B.C.....	44.0	9.8	4.1	14	9	2	Leonard C. Miles, Vancouver, B.C.
126.672	Minnie W.....	Port Arthur..	1911 Ft. William, Ont...	63.0	14'2	8.0	57	34	11	Thunder Bay Contracting Co., P. Arthur, Ont
130.791	Nahmint.....	Vancouver.....	1911 Steveston, B.C.....	67.9	15.5	6.1	45	31	6	Wallace Fisheries, Vancouver, B.C.
130.633	Neptune.....	St. John, N.B.	1911 Port Greville, N.S..	73.4	20.5	10.7	118	80	19	Robert Thomson, et al, St. John, N.B.
130.792	Nortonian.....	Vancouver.....	1911 Coquitlam Lake, B.	47.5	12.5	4.6	26	18	3	Vancouver Power Co., Vancouver, B.C.
130.793	Quathiaski No. 3..	Vancouver.....	1911 Steveston, B.C.....	42.7	10.8	4.5	16	11	2	Quathiaski Canning Co., Quathiaski Cove.B.C.
130.537	St. J. Deschaillons	Montreal.....	1910 St. J.des Chaillons.	29.5	6.0	2.8	5	3	2	Adelphie Lemay, St. Jean des Chaillons, Que.
130.236	Wilma.....	Port Stanley..	1911 Collingwood, Ont...	75.3	16.4	7.7	55	37	13½	John A. Macdonald, et al, Port Stanley, Ont.

*Foreign name "Margaret."

been entered into with the Government to build an armored cruiser of 27,000 tons, costing about $6,500,000, and to be completed in 1914. The steel for this cruiser is to come from England and Germany, and the armament from the arsenal at Kure, Japan.

France. — The International Maritime Congress, which met in Paris recently, under the Presidency of the French Minister of Commerce, M. Couyba, adopted a resolution in favor of an international agreement fixing the liability for loss of life or injuries at $35 per ton of the ship's displacement. The conference desires a uniform international rate, fixing the liability of owners. The resolution was adopted by a large majority, the American and Japanese delegates alone voting against it.

Buffalo, N. Y. — The Empire Shipbuilding Co., of which J. F. Malone of Buffalo is president, has filed a voluntary petition in bankruptcy in the United States district court at Buffalo. The liabilities listed in the schedule are $102,027.97, and the assets $80,815.36.

Buffalo, N.Y. — The largest inland ship dock in the world has just been completed here at a cost of $1,250,000. The contract was let by the government in 1908. The dock is 600 feet long and seventy feet wide. It is considered one of the great engineering feats along the Great Lakes. The gates are operated by Niagara Falls power.

WRECK COMMISSIONERS' INQUIRIES.

The court of inquiry at Vancouver into the circumstances connected with the grounding of the steamer Celtic on West Noble Island, last October, handed down its decision on December 13. After giving careful consideration to the evidence, the court finds that safe and proper compass courses were not set and steered from Masterman Island, and that there were no allowances made for deviation, leeway, or tidal stream. That the vessel was not navigated with seamanlike care by Mr. Carlson, who assumed responsibility, notwithstanding his orders to call the master on any change of weather, or doubt as to his position." The court, therefore, in view of the above circumstances, suspended Stephen Carlson's certificate as mate of a passenger steamer for a period of four months from December 13, 1911.

The court also finds that Captain Dick had to some extent lost sight of the responsibilities of a shipmaster in depending too much on what he was told of Officer Carlson's abilities and entrusting him with the navigation of the vessel in such narrow waters, and that he should have taken longer time to prove for himself whether or not the responsibility he placed upon Mr. Carlson, was justified. The court admonished him to be more careful in future and returned his certificate.

WELLAND CANAL TRAFFIC, 1911.

2,574 vessels of all kinds passed through the Welland Canal, up and down, breaking the record for any previous year in the history of the canal. In 1910, the lockages totalled nearly 400 less than in the season of 1911, though 1910 was also away in excess of all previous years. Most of the boats coming down the canal carried wheat during the season, and the bulk of the cargoes upbound for Fort William consisted of coal. Very few vessels went through light, the season being a pretty good one for marine carriers.

Perhaps more than fifty million bushels of wheat were brought down through the canal during the season, the biggest cargo being carried by the oil-driven vessel Toiler. The fastest trip from one end to the other was made by the steamer City of Montreal, which took just nine hours and twenty minutes to go through. Before the locks were operated by electricity, it would take a boat fourteen or fifteen hours to traverse the canal, but now it can be done easily in ten or twelve hours. The canal had two tie-ups during the season because of accidents.

TOWING SYSTEM ON PANAMA CANAL.

A new system of towing will be employed in taking vessels through the Panama Canal, according to specifications shortly to be issued by the American Government calling for forty electric locomotives to be used on the work. It is intended to utilize the locomotives for taking the vessels through the locks at the rate of two miles an hour. The vessel to be towed will be held between four lines of taut hawsers. The hawsers are to be attached to the windlass of four locomotives operating on the lock walls, two forward towing and two aft being towed by their hawsers, thus holding the ship steady. The locomotives are run on a level, except where they pass from one lock to another, at which point they will climb exceptionally heavy grades. There will be two sets of tracks along the lock walls, one for the return of unattached towing engines. The tracks will be of the 5-ft. Panama Canal gauge laid on 90 lb. Bessemer rails on Carnegie steel ties. Each locomotive will consist of three parts, having two tractors with a windlass between them. The windlass will be mounted on a truck and joined to each tractor by a drawbar and trunnion, giving the effect of a universal joint. The windlass will have two speeds, one for coiling the line under a load and another for coiling an unattached line.

SAILING VESSELS REMOVED FROM THE CANADIAN REGISTER, NOVEMBER, 1911.

Official No.	Name of ship.	Port of registry.	Net tonnage	Cause assigned.	Date of loss
103,424	Elva M.....	Charlottetown.....	92	Wrecked	Sept. 7, 1911.
61,587	J. & L. Irving.	Yarmouth.....	80	Stranded	Aug. 17, 1911.
94,779	O. P. Silver....	Lunenburg.....	70	Lost	Aug. 29, 1911.
111,438	Theresa M. Gray.	Halifax.....	30	Transferred, St. John's Nfld.	
	4 Vessels		272		

SAILING VESSELS REGISTERED IN CANADA, NOVEMBER, 1911.

Official No.	Name of ship.	Port of Registry.	Rig.	When and where built	Length	Breadth	Depth	Regd. tonnage	Owner or Managing Owner.
[illegible]	[illegible] W. No. 1.....	Vancouver.....	Scow....	1911 N. Westminster,B.C.	104.8	35.0	6.7	209	Davidson-Ward Co., Vancouver, B.C.
[illegible]	[illegible] /	Lunenburg....	Schr....	1911 L. Tancook, N.S....	39.6	10.0	5.4	11	Solomon Zinck, Blandford, N.S.
[illegible]	[illegible] C.	[illegible]	Schr...	1911 L. Tancook, N.S....	40.4	10.0	5.6	12	Hugh Cleveland, Blandford, N.S.
[illegible]	[illegible]ell F. Parks	Lunenburg...	Schr...	1911 La Have, N.S.....	101.8	26.2	10.2	99	Robert Parks, M.O., La Have, N.S.
[illegible]	[illegible]	[illegible]	Barge..	1911 Lund, B.C.	84.8	27.2	6.0	117	Frederick G. Thulin, Lund, B.C.
[illegible]	[illegible] M. Gardner.	Vancouver....	Schr...	1911 Lunenburg. N.S. .	106.8	26.0	10.6	100	W. Smith, M.O., Lunenburg, N.S.
[illegible]	[illegible] Robidoux..	[illegible]	Sloop..	1911 Yamaska, Que.	109.4	23.2	6.9	132	Moise Robidoux, Yamaska, Que.
[illegible]	[illegible]	[illegible] N.S.	Bgtn..	1874 Parish St. Peter, Q	102.2	22.5	11.9	154	Mrs. S. Cruickshank, Sydney, N.S.
[illegible]	[illegible]	[illegible]	Schr...	1911 Tancook, N.S.	45.0	13.6	6.8	20	George A. Wootten, Halifax, N.S.
[illegible]	[illegible]	[illegible]	Schr....	1911 Baie St. Paul, Que.	75.3	24.4	6.7	68	T. Harvey, M.O., Baie St. Paul, Que.
[illegible]	[illegible]goire ...	[illegible]	Schr....	1905 Tancook, N.S.....	39.6	9.9	5.2	10	William Baker, Tancook, N.S.

"Francois Rene."

NOTICES TO MARINERS.

THE Department of Marine and Fisheries, Ottawa, earnestly request pilots, masters and others interested, to send information of dangers, changes in aids to navigation, notice of new shoals or channels, errors in publications, or other facts affecting navigation in Canadian waters, to the chief engineer, Department of Marine and Fisheries, Ottawa, Canada. Such communications can be mailed free of Canadian postage.

No. 114—November 8—New Brunswick.

320.—Range lighthouses have been erected by the Government of Canada on the northern side of Sheldrake Island, Miramichi Bay, to replace the pole lights heretofore used, and the poles and sheds have been taken down. The towers stand immediately behind the sites previously occupied by the poles. The light is a fixed white light, elevated 23 feet above high water mark, and should be visible 12 miles in the line of range. The illuminating apparatus is catoptric.

No. 114—November 8—Newfoundland.

321.—Lights have been established at the following places in the Bay of Exploits, Newfoundland :—(1).—On Surgeon (Sergeant's) cove head, Exploits Burnt islands, a flashing white light, showing 3 bright flashes every 15 seconds. The illuminant is petroleum vapour, burned under an incandescent mantle. The house and circular iron tower are painted in alternate red and white vertical stripes. Lantern and dome, white. (2).—At the northwestern end of Upper Black island, a fixed white dioptric light of the fifth order, in a circular iron tower, painted red. Dwelling attached, white. A small store on eastern side of dwelling, painted red. (3).—On Cabbage harbor head, Thwart island, an occulting white light, visible 6¼ seconds and eclipsed 1¼ seconds alternately. The occultations are produced by a shade driven by the heat of the lamp. The dwelling house is attached to the circular iron tower by a short covered passage way, all painted white. A small store is built on the cliff, about 30 feet below the lighthouse, painted red.

No. 115—November 11—Prince Edward Island.

322.—An additional range of (red) lights has been established on Fish island, entrance to Malpeque harbor, north coast of Prince Edward Island, to lead vessels to anchorage in Malpeque harbor.

No. 115—November 11—Quebec.

323.—The back light of the Godbout range, river St. Lawrence, bears N. 59 deg. W. from the front light, instead of N. 50 deg. W. as stated in the Canadian List of Lights.

No. 116—November 16—Quebec.

324.—There is a constant downward current in the middle of the St. Lawrence estuary which continues along the south shore for the whole length of the Gaspe coast. This constant outward tendency, as distinguished from the usual tidal behavior of the Lower St. Lawrence, is first felt below Red Islet, near the mouth of the Saguenay. It is met by a cross current from Pointe des Monts, setting towards Cape Chat. Below this, the outward current is still more pronounced, and is known as the "Gaspe Current." It follows the curve of the Gaspe coast as far as Cape Gaspe, from which it sets across the Gulf of St. Lawrence towards the Magdalen islands. During the past season, this current from Cape Magdalen eastward, and the region between the Gaspe coast and Anticosti as far as Heath Point, have been investigated by the C. G.S. Gulnar, of the Tidal and Current Survey, under the personal direction of Dr. W. B. Dawson, the superintendent. Valuable information has also been obtained from the captains of coasting steamers engaged in the coal trade, who have experience in this region. The result of the investigations will be given fully in a report on the currents at the entrance to the St. Lawrence ; but the bearing of the investigations on the best routes for vessels, to take advantage of the currents or to avoid them, is explained herewith.

Methods and Observations. — In carrying out the investigations, the surveying steamer was anchored at carefully selected positions along the leading steamship routes, in all depths up to 180 fathoms. It thus served as a fixed point from which to observe the direction and velocity of the current. The observations were taken continuously, day and night, by means of current meters and electrical appliances. A continuous record of the tide, for comparison with the current, was obtained at Father Point, the reference station on the St. Lawrence. The weather conditions were also observed on board. An anemometer measured the velocity of the wind, and a continuous record of the barometer was taken.

The Gaspe Current. — Along the Gaspe coast the current sets downward, from one or two miles off shore to about ten miles off. Although constant in the sense of being always in the one direction, it is subject to a strongly marked fluctuation in speed in strict accordance with the tide ; being stronger during the ebb and weaker during the flood. Its greatest strength is at an offing of 4 or 5 miles, where it attains a speed of over 3 knots at the springs and about 1½ knots at the neaps. At an offing of 8 miles it is much weaker, and at 12 miles any current existing is no longer continuously downward.

Currents elsewhere. — In the middle of the passage between the Gaspe coast and Anticosti, and on the Anticosti side, the currents show as their leading characteristic, a continuous veer around the compass in the right hand direction, in the tidal period. There is good evidence that the water there makes westward on the whole, to compensate for the outflow of the Gaspe current.

Wind disturbance. — The most careful attention throughout the season was given to this question, with appliances registering speed to 1-50 of a knot, and comparison of the surface current with the speed and direction beneath, to detect disturbance. Nothing was more striking than the apparent indifference of the current to the wind as a general rule. The weakest currents would set directly into the wind, just as usual, as they veered around. It was not evident during the course of the investigations, that strong winds and gales had any effect on the flow of the Gaspe current, unless this can be detected when the observations are subjected to a searching analysis, with allowance for tidal fluctuation. It is the usual winds, which are almost always up or down the coast, that seem to have so little influence on the current ; but there is some evidence that with off-shore winds from the south-west, which are unusual in the summer season, the Gaspe current may be displaced in position, and lie further out. Hence, at a given offing, the current may appear to be checked by the wind, as it may have taken a different route, nearer the middle of the passage. Also, northerly winds may possibly make the current narrower and stronger, by pressing it against the coast.

The Caution on the charts, "Currents governed principally by wind," is therefore so erroneous as to be quite misleading. Again, the two lines of current on chart of Anticosti island, may be regarded as alternate routes, although the outer route, in the middle of the passage, is quite unusual and should be so indicated.

In-shore flood stream. — There are times when a flood stream is found to occupy a width of one or two miles between the Gaspe current and the shore. According to information obtained from the captains of the coal steamers, this may be described as follows :—From Cape Rosier to Cape Magdalen, at one mile off, the flood stream has a speed of one knot at the most. From Cape Magdalen to Cape Chat the downward current appears to keep close in, as indicated on the local charts ; and it is thus only weakened during the flood, without being reversed. Above Cape Chat, the upward set on the flood may extend as far as two miles from shore ; but it may not be found during the neap tides. This in-shore flood is thus more pronounced above Cape Chat, and it be-

comes a feature which extends a long way up the estuary.

Course inwards. — The coasting steamers engaged in the coal trade, when inward bound, are tempted to take a route close in shore, to avoid the Gaspe current and obtain help from the upward flood. Apart from the risk of keeping within a mile or two of the shore, this in-shore flood is in most places only strong enough to be of service about the time of spring tides, and then only for the flood period. After the six hours of flood, in which some 60 miles along the coast are made, these steamers must sheer out to a greater offing; as for the next six hours the in-shore ebb stream adds to the strength of the main current. The captains with longest experience, therefore, maintain that better time can be made by keeping out to an offing of 8 or 10 miles near the outer edge of the Gaspe current, where it is usually weak enough to be inappreciable. Record time has been made at this offing, and one captain claims that at an offing of 12 miles he only lost a quarter of an hour from current as far in as Pointe des Monts. The best inward route from Bird Rocks is to make the Gaspe coast at on offing of 14 miles at Cape Rosier, and to maintain an offing of ten miles from Fame Point to Cape Chat. Sailing vessels should tack when ten miles off. From there, the choice is open to make Manikuagan and follow the north shore, which may be advisable for better shelter in the autumn or at any other time when northerly winds are prevalent, keeping the weather clear. The investigations of this season also show that Atlantic steamers, inward bound, will gain time by making a straight course from Bagot Point, Anticosti, to a point 10 miles off Cape Magdalen, and thence maintaining the same offing till within the mouth of the estuary opposite Pointe des Monts.

Ontward course. — A distinct advantage will be gained by all vessels, by keeping in the strength of the Gaspe current, at an offing of 4 to 5 miles, from Cape Chat outward. Even steamers on the Belle Isle route may obtain an advantage by following the rounding of the coast at this offing as far as Fame Point at least, before turning off towards Anticosti. The distance that the coast should thus be followed will be greater if it is ebb tide at the time. They may then obtain as much as 3 knots in their favor which will more than compensate for the slight extra distance by the chart. All coasting steamers, and Atlantic steamers on the route south of Newfoundland, will gain by keeping this offing till they leave the Gaspe coast.

No. 117—November 17—Ontario.

325—Referring to Notice to Mariners No. 39 (101) of 1911, a new lighthouse has been erected on Red Rock, in the approach to Parry Sound, Georgian Bay, and the temporary pole light has been discontinued. The lighthouse stands on the steel-sheathed cylindrical stone foundation, 12 feet high and 40 feet in diameter, on which the old wooden lighthouse stood. The lighthouse is a two-storey reinforced concrete structure, nearly elliptical in section, surmounted by a polygonal iron lantern. The height from the ground to the vane on the lantern is 57 feet. The foundation is red, the concrete grey and the lantern red. The light is an occulting white light, visible 8 seconds and eclipsed 4 seconds alternately. The light is elevated 60 feet above the level of the lake, and should be visible 13 miles from all points of approach. The illuminating apparatus is dioptric of the fourth order. A diaphone fog alarm will be installed in the lower storey of the lighthouse, of which further notice will be given, after the opening of navigation next spring.

No. 118—November 20—General.

326.—When the Department of the Naval Service was formed in 1910, the Hydrographic Survey and Tidal and Current Survey branches of this Department were transferred to the new department, therefore, any persons desiring information respecting Tides or Currents, or respecting Hydrographic Surveys or Charts, will ensure more prompt attention if they address their enquiries to the Deputy Minister of the Naval Service, rather than to the Department of Marine and Fisheries. Notices to Mariners are only published by the Department of Marine and Fisheries, and communications respecting them, or respecting aids to navigation, should be addressed as heretofore to the Chief Engineer of Marine and Fisheries.

No. 119—November 23—New Brunswick.

327.—With further reference to Notice to Mariners No. 106 (298) of 1911, it has been found necessary, owing to boulders being found in the recently dredged portion of the channel, to move the gas buoy marking the southern edge of the shoals on the eastern side of the channel abreast of Negro point, St. John harbor, Bay of Fundy, back again to its old position 170 feet to the westward.

No. 119—November 23—Nova Scotia.

328.—A light has been established by the Government of Canada on the outer end of the Government wharf at West Arichat, Madame island, Nova Scotia.

The light is a fixed white light, shown from a lens lantern hoisted on a pole on the southeast corner of the ell at the outer end of the wharf. The light is elevated 38 feet above high water mark, and should be visible 6 miles from all points of approach by water. There is a small shed near the light pole. The pole and shed are painted white.

No. 119—November 23—Prince Edward Island.

329.—The front lighthouse of the Darnley point range, north coast of Prince Edward Island, has been moved 80 feet to the southeastward of its old position. It is now distant 1341 feet N. 50 deg. E. from the back range lighthouse.

330.—Any of the bell buoys on the north coast of Prince Edward Island will be liable to removal from their stations for the winter at any time after 1st November each year, without any notice being given.

No. 119—November 26—Newfoundland.

331.—The fixed white light heretofore shown from a lantern hoisted on a white open framework at Egg point, entrance to St. Anthony harbor, St. Mein bay, east coast of Newfoundland, has been replaced by an occulting white light, visible 2½ seconds and eclipsed 2½ seconds alternately, shown from a circular iron tower, erected near the site of the old light. The light should be visible 10 miles seaward, where not obstructed by projecting points of land. The tower is painted in red and white vertical stripes the lantern and dome white.

No. 120—November 28—Quebec.

332.—A pole light has been established by Government of Canada at Ste. Adelaide de Pabos, Chaleur bay. The pole is erected on the edge of a cliff about 19 feet above ordinary high tides and about 60 feet from the water's edge. The light is fixed red, shown from a small lens lantern hoisted to the top of the pole. It is elevated 42 feet above high water mark, and should be visible 5 miles from all points of approach by water. There is a shed at the base of the pole. The sides are painted white, and the roof and pole red. The pole is 25 feet high.

333.—A hand fog horn has been established at the lighthouse on Pointe Basse wharf, Alright island, Magdalen islands. It is used to answer signals from steamers in the vicinity of the station in thick weather.

334.—A bell buoy has been established by the Government of Canada in 13¼ fathoms of water ½ mile S. 22 deg. W. from Pearl reef, Magdalen islands, Gulf of St. Lawrence. The buoy is painted red, and is surmounted by a bell rung by the motion of the buoy on the waves.

335.—The Geographic Board of Canada have decided that the name of the point at the mouth of Grande Riviere du Chene, river St. Lawrence, county of Lotbiniere, should be spelt Langlois, and not Langlais. The name will therefore be changed in the Canadian List of Lights.

No. 121—December 5—Nova Scotia.

336.—On 1st January, 1912, the light shown from the lighthouse at Port

Lorne, Bay of Fundy, will, without further notice, be changed from a fixed white light to an occulting white light, visible 5 seconds and eclipsed 2 seconds alternately.

337.—The mast of the wireless telegraph station on Sable island is located 1 1-9 miles eastward of main flagstaff. on the summit of a sand hill, 900 feet southward from the north shore of the island.

No. 121—December 5—Quebec.

338.—Eight barrel buoys, provided by this Department, have been placed in the entrance to Bersimis river, river St. Lawrence, and will hereafter be maintained by the St. Lawrence Lumber Industrial Company. Four of the barrels are painted red and are moored on the starboard side of the channel entering the river; the remaining four are painted black and are moored on the port side. The outer black buoy and the outer red buoy are on the outside of the bar, and the others are equally spaced on each side of the channel up to the company's wharves, which are located on the north side of Bersimis point. The channel generally follows the alignment of the range lights, but is not straight.

339.—The front light pole of the Louiseville range on the west side of Riviere du Loup, north side of lake St. Peter, river St. Lawrence, has been moved 295 feet S. 41 deg. E. from its old position. The back light pole has been moved 509 feet S. 66 deg. E. from its old position, and is now distant 2720 feet N. 9 deg. 8 ft. W. from the front light pole.

No. 122—December 6—Nova Scotia.

340.—About the end of December, 1911, the gas and whistling buoy moored at Sambro Outer bank, 5¼ miles S. 5 deg. E. from Sambro island light, south coast of Nova Scotia, will be replaced for the winter months by lightship No. 15, which will be moored in the same position. Further notice will be given when the lightship is placed. She is a steel steamer with two masts and no bowsprit. The hull is painted red, with the word "Halifax" in white letters on each side, and the number of the vessel "No. 15" on each bow. The circular gallery under the lanterns at each mast head, the smokestack, and the fog signal between the masts, are all painted red. Three seventh order lens lanterns encircle each mast head, at an elevation of 60 feet above the water. From them occulting electric lights, showing bright for 8 seconds and eclipsed for 4 seconds alternately will be exhibited. These should be visible 13 miles from all points of approach. If from any cause the electric light apparatus should become inoperative fixed white oil lights, of less intensity, will be shown. The fog alarm consists of a diaphone, operated by compressed air. It will, during thick or foggy weather, give three blasts of 4 seconds, with intervals of 3 seconds between them, in each minute. Should the diaphone become disabled, blasts of similar duration and frequency will be sounded through a whistle. Should both from any cause become inoperative a bell will be rung by hand. The lightship is fitted with a submarine bell, which, during thick weather, will strike the number "14," every twenty-one seconds, as follows: One stroke; five seconds interval; four strokes at intervals of two seconds; then an interval of ten seconds. When the lightship leaves in the spring of 1912 for her station off the east end of Anticosti island the Sambro gas and whistling buoy will be replaced in its old position at Sambro Outer bank.

No. 123—December 6—Quebec.

341.—When the Anticosti lightship is replaced on her station next spring the occulting white light shown from her will have the following characteristic: —Visible 8 seconds, eclipsed 4 seconds. The fog alarm on the lightship will thereafter sound three blasts of 4 seconds, with intervals of 3 seconds between them, in each minute. The submarine bell will thereafter strike the number "14" every twenty-one seconds, as follows: One stroke; five seconds' interval; four strokes at intervals of two seconds; then an interval of ten seconds.

No. 123—December 12—Quebec.

342.—A black spar buoy has been placed in 14 feet water, 3,200 feet S. 82 deg. E. from the wharf at the north end of Dowker island, to mark the edge of the flats at that point, and also to serve as a turning mark from and to the alignment of Caron Point light in one with the edge of the trees on Dowker island. The buoy is exactly on this alignment. A red spar buoy has also been placed about 158 feet north of the intersection of the above alignment with that of Pointe Claire and Dorval lights, to serve as a turning mark from the alignment of Pointe Claire and Dorval lights to the alignment of Caron point light and the trees on Dowker island. Midway between these two buoys a third red spar buoy has been placed about 100 feet north of the latter alignment.

343.—The wooden open framework lower portion of St. Placide front range lighthouse and the cribwork pier on which it stood have been replaced by an open steel framework, square in plan with sloping sides, painted white. The light is elevated 4 feet higher than formerly, being now 19 feet above the summer level of the river.

No. 123—December 12—Ontario.

344.—The light heretofore maintained on South Bay point, Prince Edward county, lake Ontario, has been permanently discontinued. It is proposed next year to establish instead thereof a lighthouse on the west extremity of Main Duck island, of which further notice will be given.

LUSITANIA'S RECORD.

The Lusitania within the past twelve months has crossed the Atlantic no fewer than 32 times, or in other words completed no less than 16 round trips between England and the United States. During that period she has steamed over 100,000 miles at an average speed, between Daunt's Rock and the lightship, Ambrose Channel, of 24.67 knots westward and 24.66 knots eastward. The maintenance of this speed required the assistance of 192 fires in the stokehold and the consumption of 160,000 tons of coal. Over 400,000 passengers have been carried at an average of over 2,500 per trip. This of course does not include the crew, which numbers about 850 for each voyage.

CANADIAN NAVAL FLAGS.

The committee of the Privy Council, on the recommendation of the Minister of the Naval Service, acting in accordance with the terms of the agreement entered into with the Imperial Government at the Imperial Conference of 1911, advises that the following regulations be established with regard to the distinguishing flags and pennants to be flown by the ships of the Royal Canadian navy:—"All ships and vessels of the Royal Canadian navy shall fly at the stern the white ensign as the symbol of the authority of the Crown, and at the jackstaff the distinctive flag of the Dominion of Canada; such distinctive flag being the blue ensign with the arms of the Dominion inset in the fly. The white pennant will be flown at the masthead."

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ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals who Have Been More or Less Prominent in the Marine Sphere

Mr. F. Y. Harcourt has been promoted from assistant to the position of Chief Harbor Engineer at Port Arthur. Mr. Harcourt is a son of the Hon. Richard Harcourt, K.C., of Welland, Ont., ex-Minister of Education for Ontario.

Mr. Louis Coste, Ottawa, left recently for Victoria, B.C., to report on the proposed harbor works which are planned by that city in preparation for the great increase of trade expected upon the opening of the Panama Canal.

Captain John Henderson, master of the Allan Line steamship Pomerian, died during that vessel's last voyage to Canada, of pneumonia, and was, at his own request before passing away, buried at sea. The ship's flag was flying half mast on her arrival at Partridge Island, St. John, N.B. Captain Henderson, who was well known in St. John and Halifax, leaves a wife and three children. Chief Officer Alexander Braid took command in the emergency.

Captain Richard Read died at Port Dalhousie on January 5, after a few days' illness. Deceased was born in the village and had resided there all his life. For many years he was a valued employe of Muir Brothers, sailing for many years as commander of various schooners. For the past fifteen years he has been employed as master at Lock 2. Captains Thomas and John Read are brothers.

Rear-Admiral Robley D. Evans, retired, died suddenly on the evening of January 3. He had apparently been in the best of health up to the minute of being stricken. Admiral Evans started the U.S. battleship fleet in its record-breaking cruise around the world, resigning command at San Francisco because of his approaching retirement from the service. He was promoted to a captaincy in 1893, and in 1898 as commander of the battleship Iowa in Admiral Sampson's squadron, took an active part in the destruction of Cervera's fleet off Santiago, Cuba. He was a very popular officer.

Mr. W. L. Hichens, chairman of Cammell, Laird & Co., shipbuilders and engineers, Birkenhead, England, addressed the Canadian Club, Montreal, on December 11, choosing for his subject, "Northern Rhodesia :—The Evolution of a Dependency." He showed that the British system of spreading the advantages of civilization was the best known and had no difficulty in convincing his hearers that it was a good thing to be a citizen of the British Empire. Incidentally, Mr. Hichens improved the occasion by remarking that the responsibilities of Empire should not be confined to Great Britain alone, but should be shared by Canadians and other of the self-governing dominions.

Captain James M. Allen, 75 years of age, one of the old-time master mariners of Nova Scotia, died on December 12. He was a native of Yarmouth and began his seafaring life when a boy of fourteen. He owned and commanded several big vessels in the days of wooden ships, but for the past fifteen years has lived in semi-retirement in Chester and Halifax. A son is Professor J. M. Allen, of Cincinnati University.

Rear-Admiral George Francis Faxton Wilde, U.S.N., retired, died suddenly at his home, North Easton, Mass., on December 3, in the 67th year of his age. Admiral Wilde commanded the U.S. marines during the Boxer uprising, and participated in numerous movements of the allies during that period. As secretary of the Lighthouse Board, Rear-Admiral Wilde introduced gas buoys on the great lakes, established an electric light vessel on the dangerous Diamond Shoal off Cape Hatteras, and introduced the installation and operation of telephones connecting light vessels with the shore.

Gordon H. Hardie, superintendent of the B.C. Marine Railway, who left recently to take up a position in the Willis Ship Building Yards, North Vancouver, was presented with a solid gold watch, chain, locket and handsome pocketbook by the employes of the B.C. Marine Railway. The presentation took place in the joiners' shop and was made by Mr. Smith, the oldest foreman in the yards. Mrs. Hardie was presented with a silver tea service. Mr. Hardie made a suitable speech, thanking the men. The gathering broke up with the singing of "He's a Jolly Good Fellow."

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A. J. Woodward, Toronto, Ont.
E. J. Riley, Owen Sound, Ont.
Grand Auditors.

NAT. ASSOC. MARINE ENGINEERS.

The Grand Council of the National Association of Marine Engineers will meet in Ottawa from January 30 till February 2, inclusive, for the transaction of headquarters and general routine business.

SUB-COUNCIL OFFICERS.

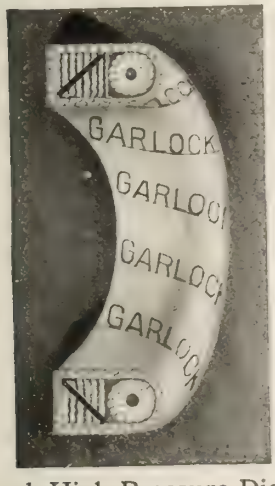
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[illegible]	8	Michael Latulippe	Lauzon	Jules Lecours	Bienville, Levis, P.Q.
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Halifax	13	D. J. Murray	Victoria Rd., Dartmouth	Chas. E. Pearce	Dartmouth, Halifax Co., N.S.
[illegible]	14	[illegible] O'Reilly	Sault Ste. Marie	Geo. S. Biggar	Sault Ste. Marie, Ont.
[illegible]	15	[illegible] Cowling	Charlottetown, P.E.I.	Lem Winchester	32 Fitzgerald St., Charlottet'n, P.E.I.

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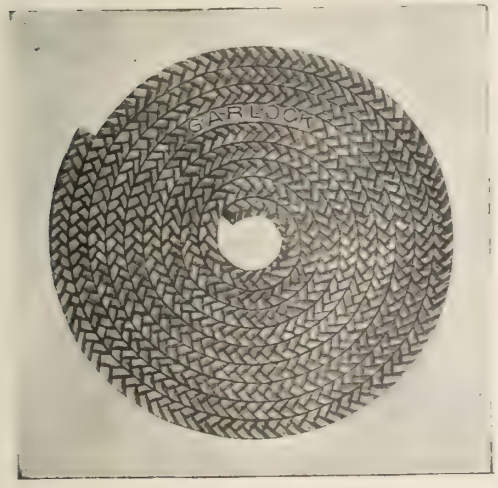
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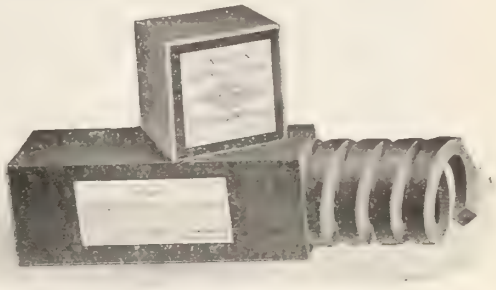
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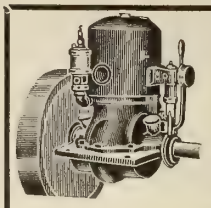


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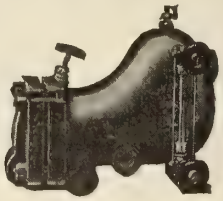
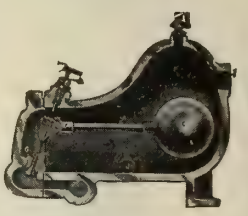
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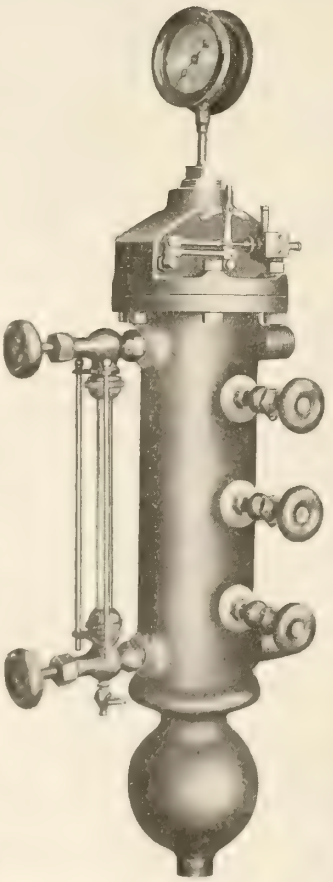
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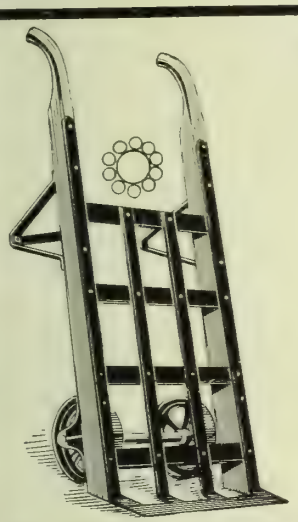
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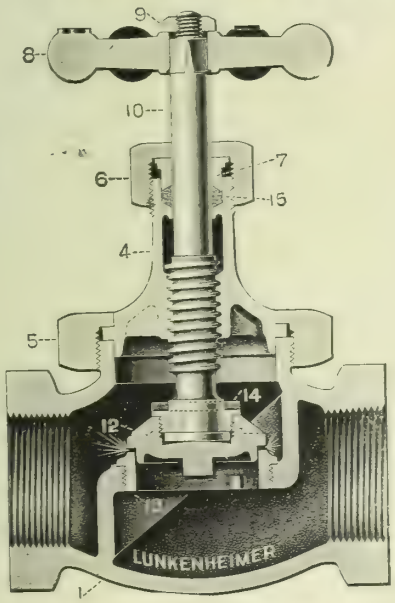
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Polson Iron Works Limited

Toronto



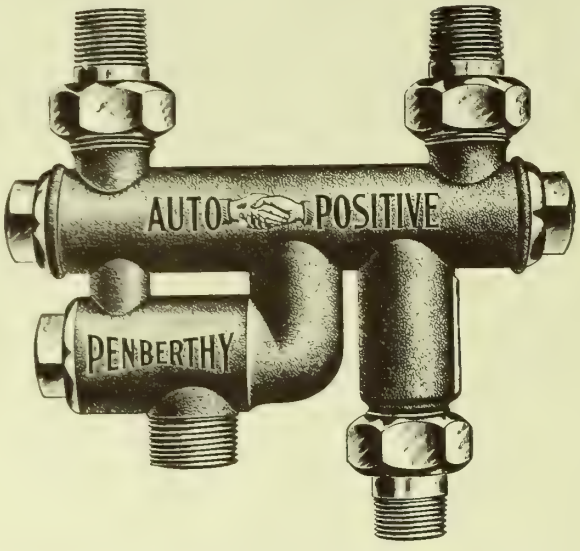
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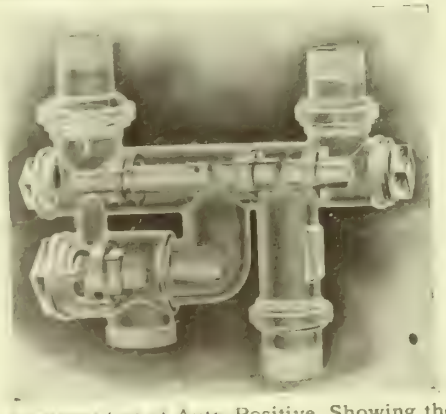
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125° to 130° Fahr., according to conditions, at..50 to 120 lbs. steam pressure.
110° to 115° Fahr., according to conditions, at..35 to 150 lbs. steam pressure.
90° to 95° Fahr., according to conditions, at..28 to 175 lbs. steam pressure.

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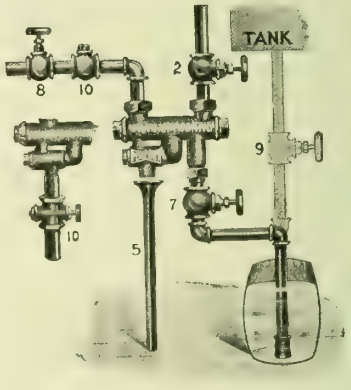


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The February Issue

contains an illustrated descriptive Article on the town and lakefront of Goderich, Ont., the first of a series of Papers on the 12th International Congress of Navigation, to be held at Philadelphia in May of this year; and a number of short extracts touching the construction and operation of the Panama Canal, in addition to a varied and concise record of the month's happenings.

MARINE ENGINEERING OF CANADA
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GRAND COUNCIL DELEGATES, NATIONAL ASSOCIATION MARINE ENGINEERS OF CANADA MEETING AT OTTAWA, JANUARY 30, 1912.

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Goderich, Ont., Its Harbor and Industrial Enterprises

By J. H. Williams

This article is intended to convey to our readers some idea of the trade and resources of this Huron lakeport town, which justly claims attention because of its many scenic, historical and commercial features. Founded in 1827, by the famous John Galt, Goderich has since shown steady and continuous progress, and at present offers many advantages to manufacturers and merchants.

ONE of the most delightful summer resorts in Ontario, and offering many attractions, both commercial and historical which are widely known, Goderich enjoys several advantages over many places of larger size. The town, situated on the eastern shores of Lake Huron, and built on a plateau overlooking the Maitland River and the lake, slopes gently toward the latter. The lay out of the streets is both interesting and unusual. The county court-house forms the hub of the town and is surrounded by a handsome park, which in summer abounds with flowers, shrubs and shade trees. This park is octagonal in form and has a perimeter of about one third of a mile. Facing it are many of the principal business houses, while radiating from this common centre, are eight principal streets at regular intervals, which bring all parts of the town into direct communication. The population numbers five thousand souls and the town's assessment value is $2,012,000. Education is well taken care of in several large, modern public schools, and in addition, there is a Roman Catholic separate school and a secondary school, known as the Goderich Collegiate Institute, which enjoys a high reputation. Other fine buildings are the public library, the customs house and the post office. There are many miles of granolithic side walks, and the waterworks and electric light station are under municipal ownership.

In walking round the central "square" one is struck by the substantial manner in which the leading financial institutions of the Dominion are represented. The Bank of Montreal, the Canadian Bank of Commerce, the Bank of Toronto, the Dominion Bank, the Sterling Bank and others have handsome branch offices in Goderich, and probably no other town of its size in Canada is so well catered to in this respect. Railway facilities are excellent, both the Grand Trunk and the Canadian Pacific Railways entering the town, which is an important transhipping point.

The Harbor, Mills and Elevators.

During the season of navigation, the harbor presents a scene of considerable activity. It is available for vessels drawing 19 feet or less, and is approached between two piers, 200 feet apart, projecting some 1,000 feet out into the lake. The harbour proper has a length of approximately 1900 feet and an average width of 850 feet. During the open season, dredging is constantly carried out, and it is hoped eventually to make the harbor available for ships of 23 feet draught.

Situated on the wharves at the south side of the harbor are the elevators and mill of the Western Canada Flour Mills Co., Ltd., as well as the elevator of the Goderich Elevator and Transit Co., Ltd. The first named company handle exclusively Manitoba wheat, brought by water from Fort William. It is here ground in flour which is then shipped by rail for the home and export trade, practically every flour market in the world being supplied. The plant comprises a mill and a 200,000 bushel elevator in one building, together with a second elevator having a capacity of 600,000 bushels, and built of reinforced concrete. The latter, built in 1909-10, may be seen on the right of our illustration, page 32, the mill and old elevator being immediately behind. Corliss steam engines aggregating about 1,000 h.p. drive the machinery here, while the larger elevator is operated by electric motors, current being supplied by a 100 k.w.d.c. generator driven by a Goldie and McCulloch Wheelock engine of 250 h.p. Steam is supplied by a battery of six return tubular boilers, five of which were supplied by the Polson Iron Works, and one by the Canada Foundry Co., Toronto.

*Associate Editor Can. Machinery, Toronto.



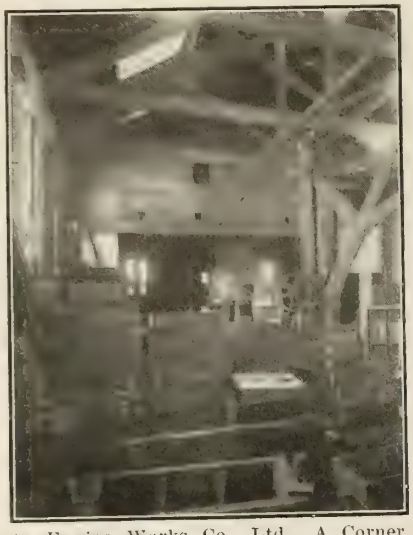
The Goderich Elevator and Transit Co., Ltd. Fireproof concrete elevator, capacity 1,000,000 bushels.

The mill and elevators give employment to about 130 men, the daily output being 2,000 barrels of flour. The company has other mills at Winnipeg and Brandon, Man., their output being 4,000 and 800 barrels per day respectively.

The elevator seen on the left of the illustration is that belonging to the Goderich Elevator and Transit Co., Ltd., who do a large transfer trade between vessels and cars, and have a storage capacity of one million bushels in a reinforced concrete elevator of fire-proof construction. As may be seen from the cut, the elevator is square, and is the only one of this type in Canada. The machinery is all electrically operated, direct current being generated by a Goldie and McCulloch Wheelock engine of 350 h.p. About 40 men are employed, and during the season of navigation last year, there were handled more than 7¼ million bushels of grain, chiefly destined for the feeding trade of Ontario and Quebec. This elevator can unload grain at the rate of 25,000 bushels per hour and has a shipping capacity of 150 cars per day. In addition to the large quantities of grain brought into Goderich last year, there also arrived by water some 15,000 tons of coal and 3 million feet of lumber, the latter being mostly consumed by the Goderich Lumber and Milling Co., Ltd., who employ 50 hands and do a flourishing sawmill business. In addition to the above items of trade, mention must be made of the fishing industry. Several fish tugs ply their calling from this port and bring in large catches, which are mostly shipped to Buffalo. This trade, however, is not as important now as it used to be.

Advantage of Location.

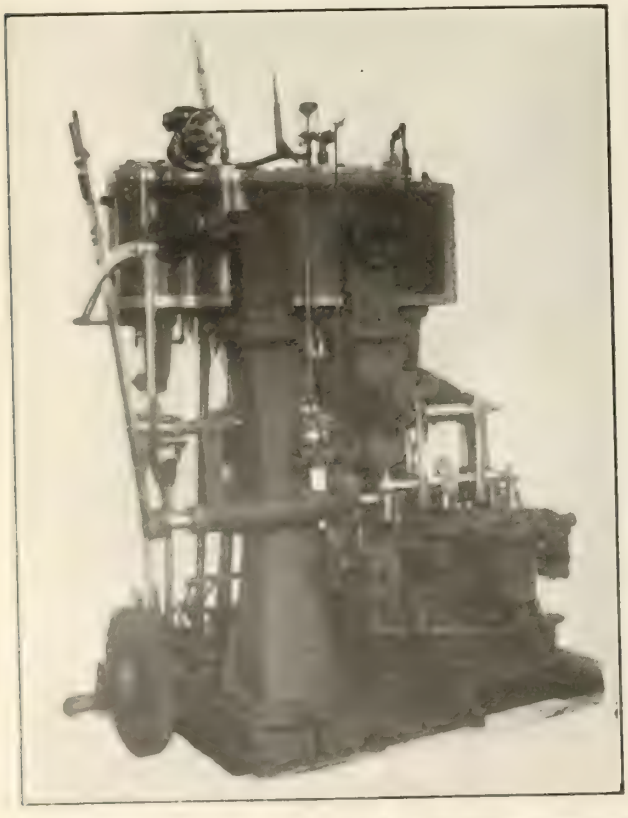
Goderich is centrally located for the distribution of domestic or export grain, and her citizens are perhaps a little jealous of the greater total tonnage entering Owen Sound and other lake ports. They claim, with truth, that they are situated 30 miles nearer Fort William than any other bay port and 60 miles nearer than Sarnia. It is a straight run from St. Mary's River to Goderich, free from intricate navigation such as is encountered on the Georgian Bay with its numerous islands and prevalence of fog. Then again it is claimed that an ordinary consolidation freight locomotive can haul only 650 tons from Owen Sound to Flesherton (35 miles), while the same engine can easily handle 1100 tons out of Goderich; the difference in the grade being one of the latter town's important advantages as a transhipping point.

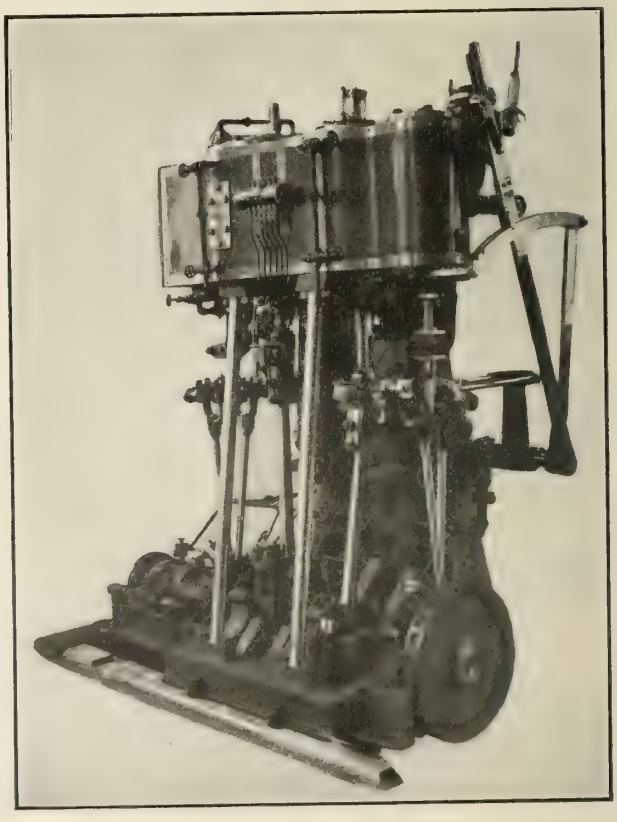


Doty Engine Works Co., Ltd. A Corner of the Foundry, Goderich.

The Doty Engine Works.

The most interesting industrial establishment in the town, from the engineers' point of view, is undoubtedly that of the Doty Engine Works Co., Ltd., the well-known builders of marine engines and boilers. This firm does not attempt to compete for really heavy work, but in building engines up to 300 h.p., can easily hold its own. Some of our illustrations give a good idea of the class of work turned out, the quality and finish being of the highest grade. The company has two plants—the headquarters being now at Winnipeg, so that the plant here described should properly be called the Goderich branch of the Doty Engine Works Co., of Winnipeg, Ltd., the business at Goderich having recently been taken over by the Winnipeg concern. Covering 4 acres of ground and compactly arranged, the Goderich plant comprises pattern shop and stores, foundry, machine shop, erecting shop,





Cylinders ... Compound Jet Condensing Marine Engine by Doty Engine Works Co., Ltd. ... Built for Fish Tug, 75 feet over all, 16 feet beam, 7½ feet moulded depth.

blacksmiths' shop, drawing and general offices. A fine boiler shop, 140 by 80 feet, has recently been completed, but at the time of our visit the equipment had not yet been installed.



Doty Engine Works Co., Ltd. New Boiler Shop, Goderich.



Doty Engine Works Co., Ltd. New Machine Shop, Winnipeg.

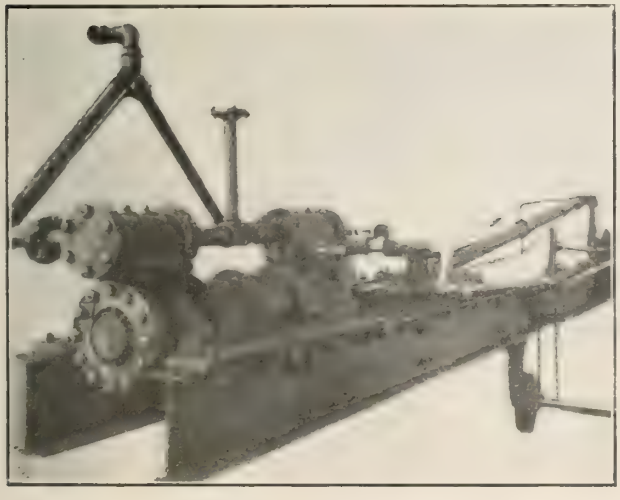
The machine shop, 108 by 43 feet, is a brick building excellently lighted by a saw-tooth roof having a northern aspect, and by numerous windows. There are two bays and a gallery, the main bay being equipped with a hand-operated overhead crane of 5 tons capacity. There is considerably more head room in this bay than in the erecting shop proper; hence the larger vertical engines are built here. One of these may be seen in the illustration, this being a fore and aft compound with cylinders 13 and 26 inches diameter by 18 inches stroke. The high pressure cylinder has independent cut-off and the engine is fitted with steam reverse gear and an independent jet condenser. The machine tools located in the gallery comprise two 20 in. and one 24 in. Lodge and Shipley engine lathes, with quick change feed and threading gears, one 24 inch engine lathe by G. A. Crosby & Co., Sarnia, Ont., one powerful 24 inch, triple geared lathe by Lodge & Shipley; a Jones & Lamson turret lathe, a double emery wheel grinder, power hack saw, and a small friction driven drilling machine. On the ground floor we noted a No. 2 Cincinnati universal milling machine, two 24 inch Cin-



Steel tug "Amelia Mae", built by Doty Engine Works Co., at Winnipeg.



Passenger Steamer "Winnitoba" and Sand Barge "Rosamond Billett" on the Red River. The latter was built and engined by the Doty Engine Works Co., Ltd., at the Winnipeg plant.



One Side of a Stern-wheel Engine by the Doty Engine Co., Ltd. This type is often built tandem compound. Note the connecting and eccentric rods, which are made of seamless steel tubing, stiffened by truss rods.



Doty Engine Works Co., Ltd. Machine Shop, Goderich.

cinnati shapers, a Mitts & Merrill key-seating machine, a Cincinnati 24 inch vertical drilling machine and two 60 inch Cincinnati-Bickford all-geared radial drills.

In addition to the above, there are included in the equipment several high-class machine tools of Canadian make.



Doty Engine Works Co., Ltd. Erecting Shop, Goderich.

One of these is a heavy triple-geared gap lathe by the MacGregor-Gourlay Co., which swings 36 inches over the saddle or 72 inches in the gap and takes 10 feet between centres. A second lathe of the same type was recently transferred to the Winnipeg shop. The London Machine Tool Co., Ltd., Hamilton, Ont., are represented by two lathes and two planers. Of the former, one is a 20-inch engine lathe and the other a 32-inch shafting lathe taking 16 feet between centres; this is used chiefly for turning crank shafts, tail shafts, etc. Of the two planers, one is a 48 inch x 40 inch x 10 feet double head machine, used for planing engine beds and other heavy castings; and the other is a 26 inch x 26 inch x 9 feet single head planer. A double emery wheel grinder by the Canadian Hart Wheels, Ltd., completes the list of the equipment, which will be seen to be of thoroughly modern description.

The erecting shop covers an area of 40 x 55 feet and is a brick building, divided into two bays by the central columns supporting the roof. Each bay is served by a 5 ton crane operated by hand from the floor. Heating is by live steam in pipe coils, as in the other shops. On the occasion of a recent visit the shop was found very full of work, orders in progress including a fore and aft compound engine with 9 x 18 x 12 inch cylinders, for a lumber mill towing tug at Buckingham, Que., and a pair of 7 x 14 x 10 inch fore and aft compound jet condensing engines for a steam paddle tug, built to the order of the Finger Lumber Co., La Pas, Sask. Each paddle wheel, 12 feet in diameter, will be independently driven by a separate engine, being connected to the shaft of the latter by 3 to 1 cut gears and pinions. Another pair of engines of the same type is on order for the Kelowna Saw Mill Co., Kelowna, B.C., and will be fitted to a twin-screw tug having 48 inch propellers.

Leading out of the erecting shop is a commodious room used as a tool store and tool-shop. In addition to the usual racks for drills, reamers, taps, etc., it is equipped with an engine lathe, used for turning bolts and studs for the erecting shop, during the time not occupied in tool-making.

The Power House.

All machinery is belt driven from line shafting, power being supplied by a Goldie & McCulloch Wheelock engine of 65 h.p. The engine runs at 90 r.p.m., power being taken from the 9 ft. flywheel by means of a 16 inch belt. The boiler house opens out of the engine room and contains a Goldie & McCulloch return tubular boiler, 66 inches diameter by 14 feet long, containing 76-3½ inch tubes. This is fed by a Smart-Turner 4½-2¾-4 duplex feed pump, taking water from an open heater. The boiler house also contains a Westinghouse 11 inch air compressor for supplying the pneumatic tools used in the machine and erecting shops.

Blacksmith's Shop.

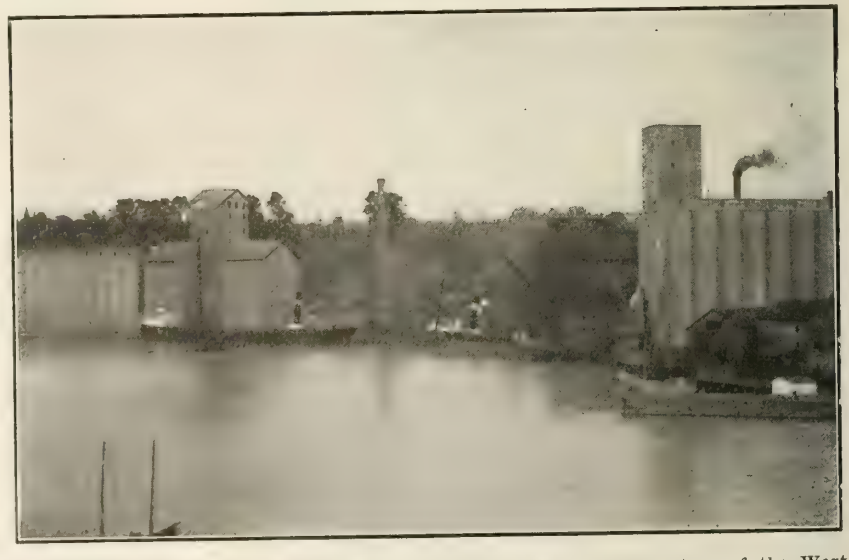
This is a concrete building, 67 feet long by 40 feet wide. It contains two smiths' hearths and a 500 pound Niles steam hammer, the latter taking steam from the boiler house, which is alongside. Blast for the fires is supplied by a Buffalo Forge Co.'s "Silent" fan, belt driven. The lower end of this shop is given over to light plate work and is fully equipped with bending and straightening rolls, hand power punch and shears together with a Bertram belt-driven shear.

Pattern Shop and Foundry.

The pattern shop is a large airy building with an area of 50 by 36 feet. It is equipped with the usual hand saw, surfacer, etc., but does not present any special features that call for comment.

The foundry is a concrete building with wooden roof, its length being 106 feet and its width 40 feet. Buttresses have been provided on each side wall to carry a runway for an overhead crane at some future date. At present the larger moulds are all laid down at the upper end of the floor, where they and their cores can be handled by the jib crane, which has a radius of nearly 20 feet, enabling it to swing from wall to wall. The 60-inch drop bottom cupola was supplied by Sheldons, Ltd., Galt, as was also the No. 8 belt driven fan which supplies the blast. The cupola is situated in an annex to the foundry and here also the core-makers work, their bench running along the wall of the core oven.

The largest ladle has a capacity of 12 tons, but it is seldom that castings as



View of Goderich Harbor. On the Right is Seen the Mill and Elevators of the Western Canada Flour Mills Co., while on the Left is Situated the Goderich Elevator and Transit Co., Ltd.

large as this are called for. Iron flasks are almost exclusively used, being found both better and, in the end, cheaper than wooden ones. Brass, as well as grey-iron, castings are made, the brass being melted in the usual way in crucibles over coke pit fires.

At Winnipeg, besides the engineering shops, the company has a shipbuilding yard and is the only firm in the city in a position to build hull and engines complete. The plant is located on the banks of the Red River, where in addition to the building slips, a substantial wharf, some 200 feet long, has been constructed. One of our illustrations shows the tug "Amelia Mack" ready for launching at Winnipeg last summer. This steel tug was built by the Doty Engine Co. to the order of the Arctic Ice Co., and is used for towing steel barges engaged in bringing ice from the latter company's storage plant, some fifteen miles down the river. Another cut shows the steel sand barge "Rosamond Billett," also built and engined by the Doty Co. This barge, 175 feet long, has fore and aft compound engines with cylinders 13 and 26 inches diameter by 18 inches stroke. She is fitted with a powerful centrifugal pump which sucks up sand from the bed of the river and discharges it into the hold through the large pipe seen projecting from the front of the aft deck house. The bed of the Red River forms Winnipeg's principal source of supply of building sand.



Passenger Steamer "Manitou," Leaving Goderich Harbor. Owned by Dominion Fish Co., Ltd., Selkirk, Man. Engined by Doty Engine Works Co., Ltd., Speed 10 Knots.

The Doty Engine Works Co. met with some misfortunes recently and the Goderich business was forced to go into liquidation. Matters have now been satisfactorily adjusted, however, and with the large amount of work on hand and the bright prospects ahead for increased development in Canada's shipbuilding and marine engineering industries, we feel confident that the company has weathered the storm and has a long and prosperous voyage ahead of it.

The Twelfth International Congress of Navigation

By the Editor

The assembling in Philaelphia, U.S.A., on May 23, 1912, of the Permanent International Association of Navigation Congresses of leading shipbuilders, marine, harbor and waterway engineers, to discuss the important question of water transportation in its various features relative to the products of the soil and of factories is of very special interest to Canadians, in that the delegates are to be the guests of the Dominion Government at the close of the Congress for a tour of inspection of our Great Lakes, waterways and leading manufacturing plants.

IN recognition of the world-wide importance of the Twelfth International Congress of Navigation to be held in Philadelphia, beginning May 23, 1912, his Excellency, William H. Taft, President of the United States, has accepted the invitation to be chief patron. He will officially open the sessions in Philadelphia, and receive the distinguished visiting scientists, engineers and official representatives of foreign nations. This acceptance by President Taft is in line with the precendent set by European rulers. Eleven preceding navigation congresses have been held in Europe—the last in St. Petersburg in 1908, under the patronage of the Czar. The twelfth congress goes to the United States by official invitation of the United States Government which voted a liberal appropriation for the reception and entertainment of delegates and visitors. A large subsidy has been granted also by the State of Pennsylvania. In accepting the invitation to become chief patron, President Taft showed sympathy with the general feeling throughout the United States that this will be one of the most important gatherings ever held on the Western Hemisphere. He realized that the coming of the congress to America at this time is most opportune in view of the approaching completion of the Panama Canal and the proposed undertaking of other large improvements to American waterways.

Popular interest in waterways development has grown to amazing proportions within the last few years. It is not confined to engineers and shipping experts but has spread to all classes of business men who realize the great possibilities in development of water transportation. This interest is largely due to the new problems in waterway improvement which confront the United States and Canada, and the manner in which the engineers of these countries have set about to solve them. It has been arranged by the official organizing commission and the Canadian committee that delegates to the congress shall see a number of these great engineering projects as the guests of both governments. Excursions to the Great Lakes and to other places have been planned.

According to advices received at the offices of the Permanent International Association of Naviation. Congresses in Brussels and by the general secretary of the twelfth congress, Lieutenant-Col. J. C. Sanford, in Philadelphia, every one of the thirty-five nations belonging

to the association will probably send official delegates. In addition to these, there will be hundreds of engineers and authorities on navigation from Germany, Russia, France, Belgium, Holland, England, Sweden and other European countries. Several large traveling parties have arranged to sail for America in May. The proceedings of this congress will have an unusual importance, because it will be the last meeting before the opening of the Panama Canal, which latter will largely alter the shipping map of the western world. Among the members of the Congress who have been delegated to prepare papers are the foremost authorities of Europe on maritime and inland waterways; and America and Canada will, of course, be represented by their foremost engineers. The papers and discussions will be divided between two general sections, one relating to ocean navigation and the other to inland waterways. The subjects to be covered are the maintenance and improvement of waterways, charting and protecting of maritime routes, dimensions and construction of canals, docks and wharves, handling of water-borne commerce, etc.

Canals and Docks.

One of the most important questions is that relating to the proper dimensions for ship canals of the future, depending as it does on the probable size limit of ocean steamships. The growth in size of modern steamers has so far kept in advance of all predictions and has made inadequate not only the docking facilities of ports but also all canals of the world except that at Panama. The construction of dry docks and other facilities for the docking and repairing of modern merchant vessels and warships is another subject to be discussed. Rapid increase in the size of ships of both these classes has made this question a live one in navigation circles. Many of the dry docks of the world built only a few years ago are now inadequate. America and Canada are particularly behind in this respect. At the present time, according to information gathered by James Donald, a prominent American naval architect, who will report at the Navigation Congress, there are 18 transatlantic steamers trading to New York that cannot be docked anywhere on the western side of the Atlantic. There are 35 steamers calling at New York that cannot be docked at that point, and more than twice that number cannot be docked except at the U.S. naval docks. France, Germany and England have been able to more nearly keep up with the unexpected development of the monster vessels but still their docking and repair facilities are inadequate.

The importance of this subject is indicated by the fact that six of the foremost authorities of Europe will present papers at the coming Congress. These include M. Guiffart, engineer of the Ponts et Chaussees, of France, and Edward Egan, Inspector of Hungarian State Railways and Professor of Naval Construction at Buda-Pest, both of whom are recognized as two of the greatest dock experts in the world. M. Guiffart will devote his paper chiefly to the great graving docks which France is building for her war fleets at the naval stations of Brest, Cherbourg and Toulon and to accommodate the giant ocean liners at the port of Havre.

The immediate necessity of larger docking facilities for war vessels is pointed out by M. Guiffart as follows :— "The size of modern battleships has grown with leaps and bounds, and there has resulted such an augmentation in their dimensions that, in France at least, the largest docks of the naval ports were found to be only sufficient to take the new cruisers. When the new battleships and cruisers of large tonnage were placed on the slips, in order to follow the lead set elsewhere, it was therefore necessary to undertake the construction of docks sufficiently large and in a sufficient number to satisfy the new requirements." According to the dimensions which have been foreseen for large battleships, the length of the great dock at Cherbourg has been fixed at 238 metres and the entire new equipment is on a scale to correspond. The dimensions of the new dock at Havre, says M. Guiffart, were the subject of considerable controversy, since this dock is designed to accommodate not only the largest of the high-speed vessels plying across the Atlantic, but any that may be built or planned in the near future years. It was finally decided to construct a dock 312 metres in length but capable of enlargement to 500 metres should vessels of that enormous size be constructed. That this size of vessels is not only possible but probable is indicated by the large expenditure of the French government in building a costly dock to care for them.

The relative merits of the floating and graving types of dock will have considerable discussion at the coming Congress. Germany has built large floating docks of 35,000 aod 37,000 tons for her merchant vessels but the French authorities have selected the stable graving type for all their large works. L. Luiggi, senior inspector of the Genio Civile, of Italy who will report the progress of that country in dock construction at this congress, is also in favor of the graving type of dock wherever it is possible. It was Signor Luiggi who built one of the first of the world's modern large docks at Bahia Blanca, Argentine Republic. When this dock was constructed 750 feet long, it was considered by many experts to be larger than would ever be necessary, but Argentine is now having two battleships built in American shipyards that will test its full capacity.

Canada and the Delegates.

The marine department of the Canadian Government has been particularly active in making arrangements not only for the reception and entertainment of the delegates at the close of the congress, but in having a handsomely illustrated booklet prepared, descriptive of the leading lake and ocean ports, their equipment and facilities ; our principal railroad terminals, locomotive and steel plants, marine, mechanical, electrical, hydraulic and mine engineering works, factories, etc. Major George W. Stephens, president of the Montreal Harbor Board, is associated with W. A. Johnston, Deputy Minister of Marine and Fisheries in carrying out and developing the various arrangements, and the good progress being made due to their well directed efforts will enable us to detail more fully in the March issue of Marine Engineering, the not insignificant part which the Dominion of Canada proposes to take in making known to the world her wonderful resources and achievements.

INFLUENCE OF DEPTH OF WATER ON SPEED OF SHIPS.

SHIP designers have long been aware of the influence on a ship's speed exercised by the relative depth or shallowness of the water through which she is moving, but it is only in recent years that the question has been systematically investigated. Experiments were carried out, chiefly in Great Britain, in order to obtain data for use in the design of high speed war vessels, but said data was of use to but a limited number of shipbuilders. However, the subject has lately been further investigated by Professor Sadler, of Michigan University, with especial reference to its bearing on the design of the ordinary commercial type of steamer. Professor Sadler carried out his investigations by means of models in an experimental tank similar to that described in Marine Engineering of Canada last October. The results of these experiments were presented last November before the New York Society of Naval Architects and Marine Engineers in a paper entitled "The Resistance of Some Merchant Ship Types in Shallow Water." The investigations tend to show that the data already obtained for battleships are equally applicable to the mercantile marine for all but exceptionally full forms of hull.

The United States Navy authorities also conducted similar experiments with the battleship Michigan, on three different measured mile courses. These, the

Rockland, the Princetown and the Delaware, have depths of 66, 26 and 24 fathoms respectively. The U.S.S. Michigan is 450 feet long by 80 ft. beam and draws 24½ feet of water, so that to the outsider, the Delaware measured mile with its depth of 24 fathoms would seem to afford ample water for a ship of this size. Nevertheless, it is a fact that her engines had to develop 18,300 h.p. to drive her at 19 knots on this course, whereas the same speed was attained with 16,880 H.P. on the Rockland mile with its 66 fathoms of water. Similar experiments with torpedo boat destroyers drawing only 8 feet produced results equally surprising.

Draught is not the only factor affecting the question; length and speed must also be considered, and while space does not permit of a full treatment here, the following formula embodies the deductions of the best authorities and gives the minimum depth of water permissible, in order that a vessel may develop her designed speed:—

$$D = \frac{10 \times d \times s}{L}$$

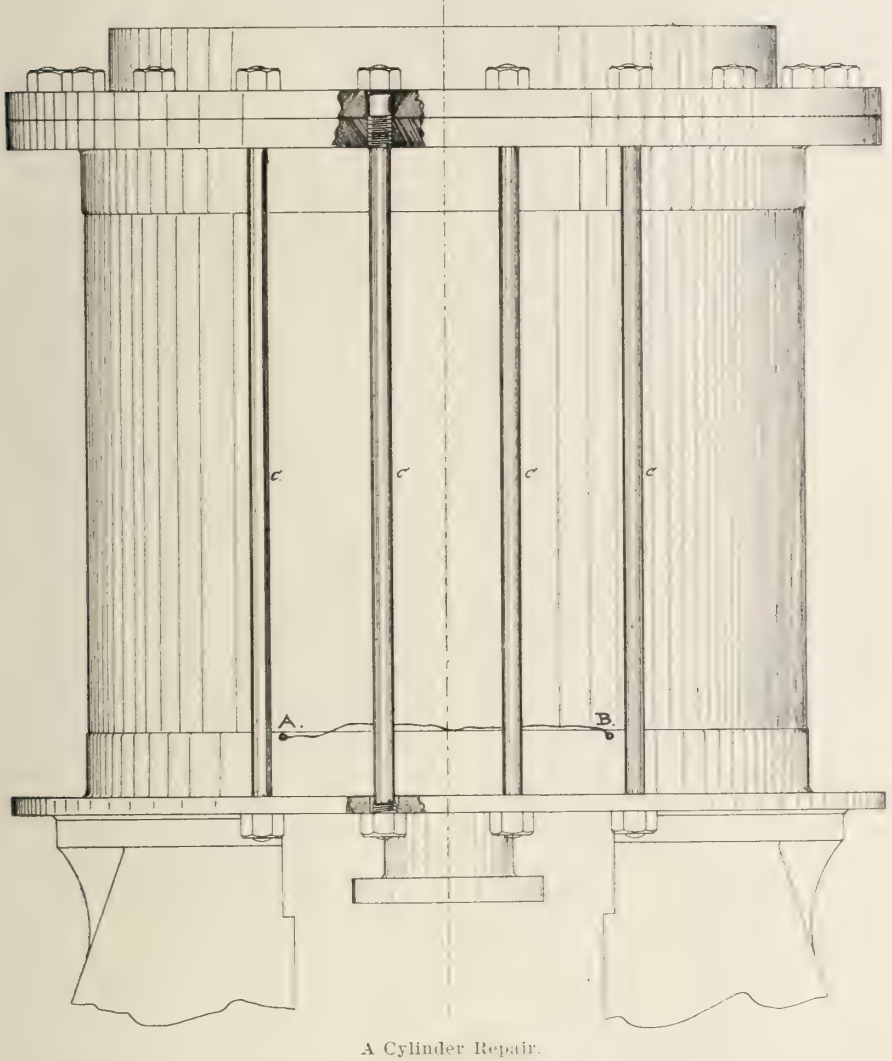
where D=required depth of water in ft.
d=draught of vessel.
s=speed in knots.
L=length of vessel in feet.

A CYLINDER REPAIR.

By Geo. E. MacColl.

THE L. P. cylinder of a coasting steamer's engines was found to be cracked on the wall as shown at A.B. on the accompanying illustration, and it was necessary to repair this in such a way as would enable the vessel to be kept running until a new cylinder could be cast, machined, and made ready for installing.

It was first suggested to fit a patch over the crack, secured by tap bolts, but this was not considered entirely satisfactory. The firm who were to make the repairs proposed and carried out the following alternative method. Four of the cylinder cover joint studs were removed, and in their place, four studs, C,C,C,C, having long bolt ends, were fitted; the end of each being carried down through holes drilled in the bottom flange of the cylinder, as shown, enabling a heavy pull to be got between the two flanges, which kept the crack closed. The bolt ends were tightened up when the cylinder had expanded under thorough heating up.



A Cylinder Repair.

This simple and inexpensive repair was completed within the space of a few hours while the vessel was discharging, and did not cause a moment's delay in her sailing. It proved thoroughly effective, so effective indeed that had the underwriters not already agreed to the cost of removing the fractured cylinder, the old cylinder as repaired would have lasted out the life of the engines. A hole was, of course, drilled, tapped and plugged at each end of the crack to prevent its extending.

TORONTO HARBOR REPORT FOR 1911.

The annual report of the Harbor Master, C. W. Postlethwaite, issued recently, shows that in 1911 there arrived in Toronto harbor 3,192 vessels against 3,402 in 1910. The net tonnage, however, was higher than in 1910, showing that larger boats are being engaged.

Receipts of coal during the year by vessel amounted to 126,229 tons, which is 1,695 tons less than last year. It is pointed out in this connection that the coal brought into the city by vessel is but one-tenth of that brought in by rail, being due to the fact that the city is extending north and west, and the railways are able to deliver coal at the doors of the consumers.

38,062 cubic yards of dredging was done in the harbor during the year.

There are 75 vessels wintering in the harbor besides dredges and scows. The number includes ten passenger steamers, nine steam barges, three schooners, four tow barges, eleven ferry steamers, two house boats, and about 26 sailing vessels; in all 21,827 tons register. Expenditures for the year amounted to $13,380.86 and receipts $11,659.07.

Engineer's Report.

Mr. J. G. Sing, engineer-in-charge, Public Works Department, reports as follows:—

During the past year a channel has been dredged through the bar, 200 feet in width on top by about 600 feet in length at the entrance to the Eastern Channel and to a depth of 20 feet below zero on gauge. Concrete superstructure has been placed on the north end of the east pier of the Eastern Channel for a length of 650 feet, and a small boat landing was constructed near the centre of same.

The work of construction of the western entrance to the harbor has been practically completed, and consists of a channel through the sand bar to a depth of 18 feet below zero of gauge, and a width of 400 feet between the piers. The north pier is 2,200 feet in length, composed of crib work substructure and concrete superstructure.

PUMP CONNECTIONS.

By Joseph W. Hayward, M.Sc.

MORE lives are spoiled by little worries than by big troubles. Many a man who could bear the loss of a thousand dollars without opening his mouth, will tinge blue with profanity the atmosphere of his whole house, over a broken collar stud. The little worries about an engine room are as bad as the rest, and since not a few of them arise from a bad arrangement of the piping for pumps, the writer proposes to give a few pointers with regard to this matter. People who ought to know better often lay down these details quite incorrectly. For example, a presumably capable steam engineer was once testing a condenser; it was of new design and he was going to condemn it because it had sprung a leak during every test. A hydraulic man came along, looked at it, measured up the water piping, did some figuring on his shirt cuff, and remarked: "There is a pressure of thirty pounds per square inch on the water side in there." The steam man was sceptical till a gauge was put on to prove it. Larger discharge connections were afterwards set up and all trouble ceased.

Even for the smallest of water piping the following rules should always be adopted:

1.—Don't let the average velocity of the water in the pipes exceed five feet per second.

2.—Avoid sharp elbows and sudden changes of section.

3.—Have large air vessels on both sides of every reciprocating pump.

The size of piping required to satisfy rule 1 in any particular service can be found as follows:

d=Diameter of pipe in inches.
D=Diameter of pump in inches.
L=Stroke of pump in feet.
N=Strokes per minute.

$$d^2 = \frac{LND^2}{300}$$

Take twice this value of d for a duplex pump and about two-thirds for a single acting one.

Loss of Pressure.

The loss of pressure in straight piping of reasonably smooth bore is given by the formula.

$$p = \frac{1}{465} \times \frac{LV^2}{d}$$

Where p= reduction or loss of pressure in pounds per square inch, in a length of L feet of piping, d inches in diameter, when water passes through it at the rate of V feet per second.

The full curves in figure 1 have been derived from this formula to show the losses of pressure per hundred feet of piping, for velocities of 3, 5, 7 and 9 feet per second. The dotted curves have been added to show the loss in pipes of various sizes, for a constant total discharge. Thus, a velocity three feet per second in a six-inch pipe gives the same discharge as a velocity of nine feet per second in a three and one-half inch pipe with less than one-twelfth of the resistance. Water is a heavy inelastic substance, hence, any sudden change in its speed or its direction of motion will cause shock or loss of energy. That

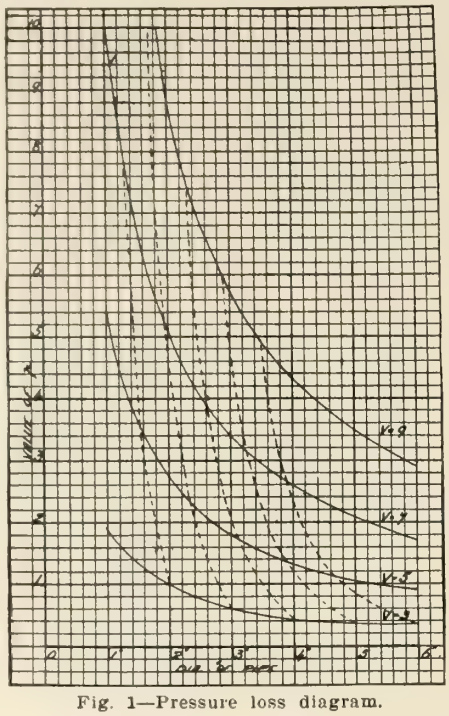


Fig. 1—Pressure loss diagram.

there is little or no loss in passing it through the long, tapering nozzle of a fire hose, or around a pipe bend of more than four diameters in radius, is due to the changes occurring gradually in these cases. Air vessels act as springs to compensate for the rapid changes in velocity of a reciprocating pump plunger, and reduce the resultant changes in speed of the water pumped. Some variation is unavoidable, and must also be introduced at all joints, branches and valves in the pipe line. By reducing the shock at these latter points, an intelligent engineer may secure some economy and avoid much annoyance. The loss caused by sockets, elbows, etc., is best expressed by stating, in diameters, the length of straight pipe which causes the same resistance. This length reduced to feet, can be added to that of the straight piping to obtain a total from which the whole resistance of any system can be computed by a single application of formula 2. Thus, a socket joint in a two-inch pipe causes the same resistance as 2×24÷12=4 feet of straight pipe, an elbow as 2×60÷12=10 feet, and so on.

A table of such resistances, as determined by professor Goodman is appended.

Nature of Resistance.	Equivalent length of straight pipe expressed in diameters.
Right-angled elbow	50 to 60
Right-angled bend of 4 diameters radius	3 to 5
Sockets (screwed)	24
Sudden enlargement or contraction	10 to 15
Mushroom valve	120 to 150

THE PACIFIC MAIL STEAMSHIP CO.

Four palatial steamships costing in all $11,500,000, are to be built for the Pacific Mail Steamship Co. and will be operated upon the opening of the Panama Canal, between New York and the Orient by way of San Francisco, according to the latest gossip from the Golden Gate city. Plans for the mammoth liners have been prepared, and R. P. Schwerin, general manager of the company, is now en route from Frisco to the Atlantic seaboard with a view to finding a builder. The plans call for vessels of the finest type, and in keeping with the limitations imposed by the Panama Canal.

According to information received, the steamships are to have a length of 680 feet with a 75-foot beam, the unusual width reducing the draft to 30 feet. Each vessel will have accommodation for 300 first-class, 200 second-class and 300 steerage passengers, together with a freight capacity of 17,000 tons. It is not announced whether the ships will be equipped with turbines or not, but they will be equipped for oil fuel burning. The guaranteed speed is 17 knots, at which rate, the trip between New York and San Francisco will be made in 17 days.

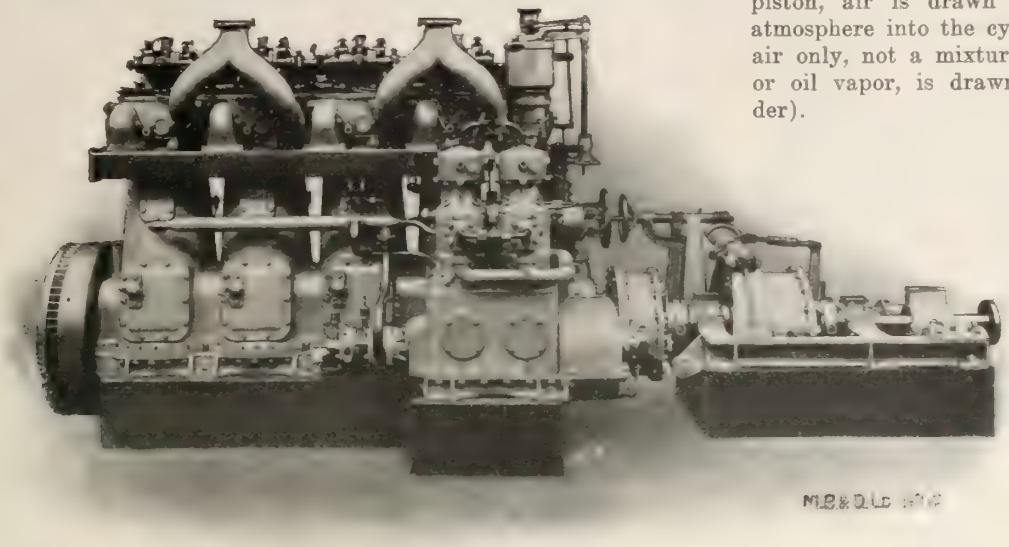
When these crack liners are completed they will be the leviathans of the Pacific, being larger than any now operating on this ocean or others contemplated by steamship companies. It is expected that very shortly the contract will be awarded for the construction of the ships and that the keels will be laid immediately afterwards and the work rushed to completion. The company intends to have the liners ready when the canal opens.

The Pacific Mail Steamship Co. is one of the largest shipping concerns in the United States.

THE "MIRRLEES-DIESEL" OIL ENGINE.

By Helenslee.

THE rapid development and progress apparent in the realm of internal combustion engines makes incumbent, on proprietors and operators of power plants, a more than passing knowledge of what is being achieved in this direction, and despite the utilization for some years to come, possibly of water power and steam plant installations, there is undoubtedly looming up on the near horizon, a formidable competitor to both, where questions of power generation are involved. The Diesel oil engine is being surely and steadily improved and perfected, due to its principles of design, construction and operation being more clearly understood, and the fact that a number of units are already installed in Canada, with prospects of being still further added to in the present year, goes to show that in many quartres of this Dominion those interested in power plant practice are alive to the attainments and successes of the most modern and up-to-date equipment available.



120 B.H.P. Mirrlees-Diesel Oil Engines for Propulsion of 50 ft. Admiralty Pinnace.

The "Mirrlees-Diesel" engines are all of the vertical type, and their mechanically operated valves are arranged in the cylinder covers. Each valve has a removable seat, being a very important improvement, as it enables the engine attendant to grind-in spare valves at his leisure instead of having to do it while the engine is stopped. When a valve on the engine requires attention, he has only to pull out the valve and seat and replace them by a spare valve and seat.

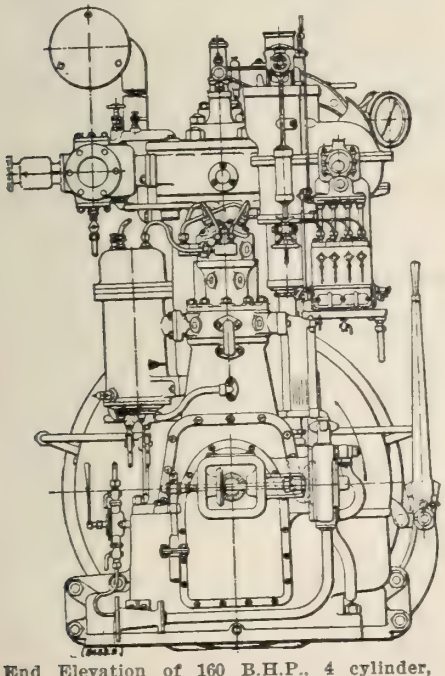
Cycle of Operations.

The engine is single-acting and operates upon the well-known 4-stroke cycle, one stroke in every four being a power stroke. The cycle is as follows:—

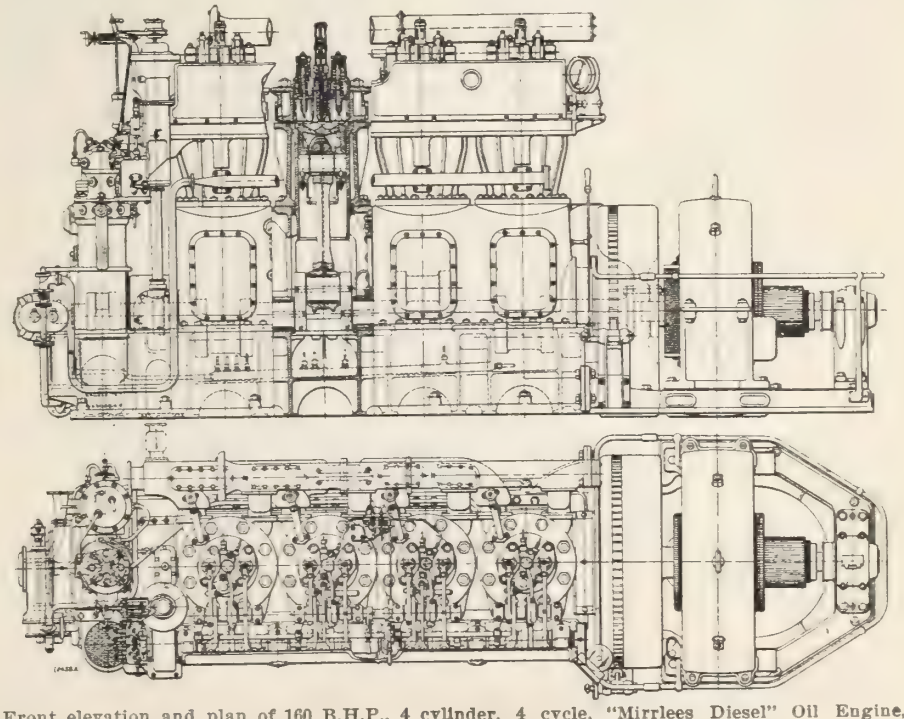
1.—On the first down-stroke of the piston, air is drawn direct from the atmosphere into the cylinder (note that air only, not a mixture of air and gas or oil vapor, is drawn into the cylinder).

2.—On the first up-stroke this air is compressed; this compression causing the temperature of the air to rise sufficiently to ignite fuel sprayed into it.

3.—At the end of the compression stroke, and during the first period of the succeeding down stroke, fuel oil is blown into the cylinder by compressed air; the oil is sent into the cylinder in a finely divided spray, and is not injected suddenly, but over a measurable period of time, thus avoiding any rise of pressure after the completion of the compression stroke. The amount of oil thus delivered



End Elevation of 160 B.H.P., 4 cylinder, 4 cycle, "Mirrlees Diesel" Oil Engine, direct-connected to generator.



Front elevation and plan of 160 B.H.P., 4 cylinder, 4 cycle, "Mirrlees Diesel" Oil Engine, direct-connected to generator.

to the cylinder is controlled by the governor so as to suit the variations of load.

4.—The next up-stroke is the exhaust stroke, during which, the products of combustion are expelled to the atmosphere.

From the foregoing description, it will be seen that there is no explosion or sudden rise of pressure in the working cylinder, hence greater smoothness in running and absence of concussion; also that as air only is compressed, there is no possibility of premature ignitions. Further, as the oil is ignited by the heat produced by the compression of the air, no troublesome sparking or ignition devices are required. It will also be noted that no carburetter or vaporiser is necessary.

Air Compressor.

The compressed air required for blowing the fuel into the cylinder, also for starting-up, is supplied by a two-stage air pump which forms part of the engine, being direct-driven from a crank formed at one end of the crank shaft. The "Mirrlees" were the first to operate the air compressor in this manner, thereby eliminating a complicated system of linkwork, when driving the air compressor from the connecting rod. Another feature is a patented device for reducing the consumption of lubricating oil. It also prevents oil reaching the valves, thereby rendering them free from carbonized oil, and making them reliable and suitable for long periods of working without attention. This compressor has been brought to a high state of efficiency, and embodies many important improvements in its details of construction.

Lubrication and Fuel Bye-Pass.

Great attention has been paid to ensure perfect lubrication of all the working parts in the simplest and most efficient manner possible, so that the attention of the engineer to this important factor is practically only five to ten minutes a day.

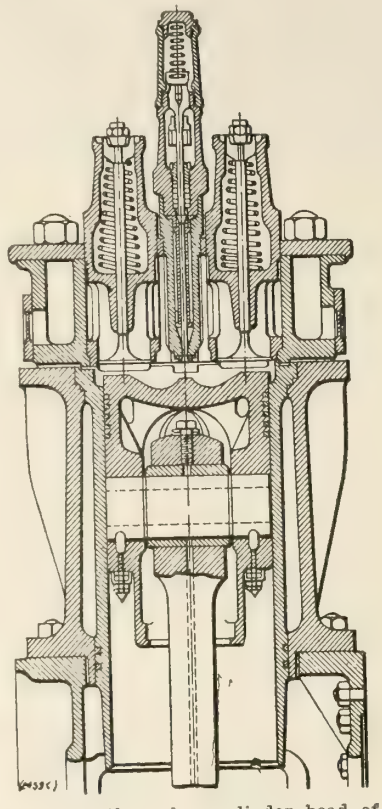
Previous to designing a fuel bye-pass gear, the fuel oil was—during the starting of an engine, with the needle valve or fuel admission valve out of operation—pumped for several strokes by the fuel pump into the casing around the needle valve; as a consequence, by the time the starting operation was completed, there was considerable accumulation of fuel oil, and this was blown into the cylinder when the needle valve was put into operation by the starting handle. This excess of fuel oil was liable to cause excessive pressures and do injury. The bye-pass device obviates this.

Cost of Running.

The cost of running Diesel engines depends, of course, primarily on the cost of fuel oil. This rose steadily in price up to the end of 1907, but has recently shown signs of an equally steady decline. In considering the price of oil, it is important to remember that the "Mirrlees-Diesel" engine works equally well, and without any alteration, on residual petroleum, residual shale oils, natural petroleum, refined oils, or practically any clean fuel oil. By residual oils we mean the residue left after the natural oil has passed through the distillers, and has had driven from it all the lighter oils. This residual oil is commonly spoken of as "crude oil." Care should be taken, however, to stipulate oil free from tar and acids.

Oil Consumption Per B. H. P.

With varying loads, the following figures have been obtained from Diesel oil engines on trial and during service,



Cross section through a cylinder head of the 160 B.H.P., 4 cylinder, 4 cycle, "Mirrlees Diesel" Oil Engine.

a perusal of which makes possible an accurate calculation as to cost of operation, and, further enabling a comparison to be made with other forms of generators:—

Full load . . .	.5	lb. per b.h.p. per hour.	
¾ load	.52	"	"
½ load	.6	"	"
¼ load	.8	"	"

For larger engines the fuel consumption per b.h.p. is lower, and even for small engines the figures stated leave a margin.

Experience has shown that the cost of repairs and wear and tear are very low, and compare more than favorably with the figures of most other engines.

The Diesel, besides being most economical, shows a high thermal efficiency.

The half-tone illustration shows a 120 b.h.p. Mirrlees-Diesel engine used to propel a 50-ft. admiralty pinnance and the line cuts, a 160 b.h.p., 4-cylinder, 4-cycle "Mirrlees Diesel" engine direct-connected to a generator. Mirrlees, Bickerton & Day, Ltd., Hazel Grove, Stockport, England, are the makers of the Diesel engine, whose features we have just described, and their representatives in Canada are the Canadian Boving Co., 164 Bay street, Toronto, to whom we are indebted for the accompanying cuts.

UNDERWRITERS' LOSSES.

Not including the passenger steamer North-west, of the Northern Steamship Co.'s fleet, damaged by fire while lying at her dock at the Fifft Farm, Buffalo, last spring, the claim for which was settled for about $260,000, marine accidents of the season of 1911 cost the underwriters approximately $600,000, according to a bulletin issued a few days ago.

Including tugs and other small craft, 32 vessels were wrecked during the past season . The steamer E. L. Fisher is included in the list of total losses, as the underwriters settled with the owners on that basis. The steamer is being repaired at Toledo. Four steel vessels, the John Mitchell, E. L. Fisher, Joliet and Turret Cape were lost. The Mitchell, which was sunk in a collision with the steamer William Henry Mack on Lake Superior, was the greatest loss of the season. She was insured for $240,000. The Fisher and the Joliet were also collision losses. The Turret Cape stranded on the rocks at the entrance to the Georgian Bay, and was abandoned to the underwriters. Five of the lost wooden vessels were in collisions, seven stranded and four were destroyed by fire. Five vessels went down in Detroit and St. Clair Rivers, four in Lake Superior, three in Lake Erie, four in Lake Michigan, and three in the Georgian Bay. The steel steamer Joliet and a number of wooden boats were not insured. Most of the wrecked vessels were small carriers.

The names of the vessels lost during the season are as follows: John Mitchell, E. L. Fisher, Joliet, Turret Cape, Maine, Tampa, Rappahannock, F. H. Prince, City of Genoa, Three Brothers, A. L. Hopkins, Thomas Cranage, Arundel, D. Leuty, A. D. Hayward, City of Kalamazoo, Raleigh, Warrington, Edward Kelly; Ottawa, W. A. Young, Azov and Albatross.

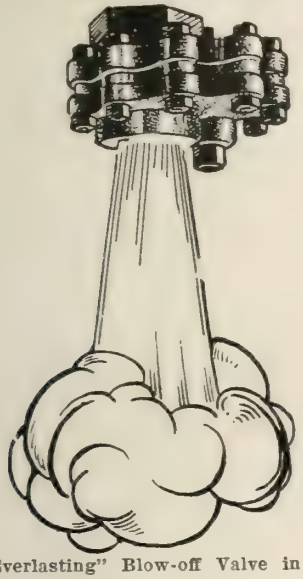
PROGRESS IN NEW EQUIPMENT

There is Here Provided in Compact Form a Monthly Compendium of Marine Engineering Product Achievement.

THE BLOW-OFF VALVE.

By Calliope.

IS the blow-off valve of sufficient importance in the boiler room to warrant strict attention? Yes, it certainly is. A leak is waste, and waste is loss. All leaks are bad, although some are worse than others, and a leaky blow-off



The "Everlasting" Blow-off Valve in Action.

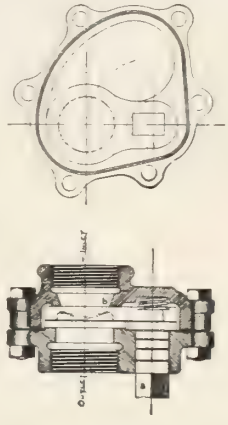
is one of the worst. It bears a very close relation to the profit and loss account. A great many accountants do not know that a blow-off valve exists, and most of those who do know are under the impression that it is situated on the top of the boiler. The question is: How much effect will a leaky blow-off valve have on the losses? It can be figured directly back to the coal pile, and the coal pile costs money. Coal saved is money added to the profits, and profit is what we are all after.

To Haswell we are indebted for the following information. To evaporate one pound of water, that is, to produce steam, 1,146 heat units are required. One Imperial gallon of water weighs ten pounds, therefore, it takes 1146×10= 11,460 heat units to evaporate one gallon of water. Now, assuming 6,000 units as the average economic value of coal, then 11,460 divided by 6,000 =1.9 lbs. of coal consumed to evaporate one gallon of water. Assuming that this is over-estimated, and the loss occasioned by one gallon of water leaking away, to be only one pound of coal, then a blow-off valve would not have to leak very badly to lose 5 gallons of water an hour, 120 gallons every 24 hours, and 3,600 gallons in thirty days, or a little over 1¾ tons of coal a month. This is approximately a loss of $8 per month, almost enough to pay for a good blow-off valve in one month's saving, and just that much more added to the profits for the other 11 months of the year.

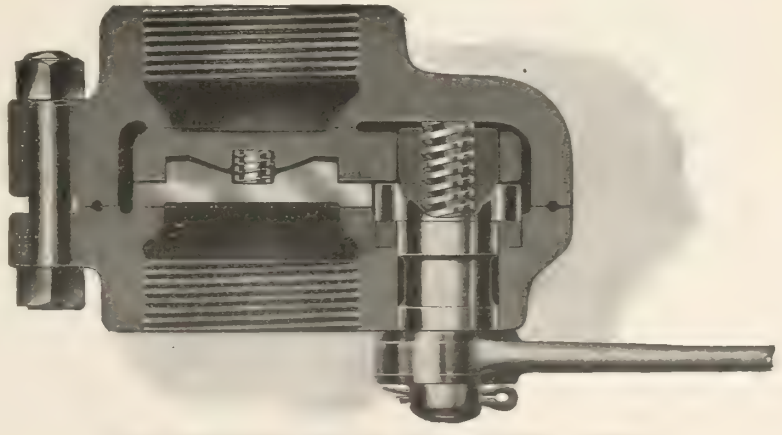
The blow-off valve is one of the loss producers or loss preventers, and just how much can only be determined by the size of the leak. The time to stop the leak is when it first starts, because every little dribble is costly. Did you ever try to maintain pressure in a small tank, with a leak in it, by means of a hand-presure pump? It is quite a strain on the muscles, and a drain on the energy of the man doing the pumping; yet there are a great many coal piles subject to as big a strain, on account of the blow-off valve leaking. You cannot always see the leak, but it's like the suit of clothes in the traveler's expense account, there all the same. The blow-off valve as a waster is overlooked in a great many cases just for that reason, and one of the best methods of being sure of its effectiveness is to install a fitting made for the particular purpose. Money spent that way is money well spent.

There are a number of good blow-off valves to be had, and one of the newest, and therefore, perhaps, worthy of special mention here on account of its design, is the Everlasting blow-off valve, recently put on the market by F. M. Patterson, at one time chief engineer of Cramp's shipyard. Mr. Patterson, in his design, has endeavored to prevent the possibility of the vital parts of the valve from coming in contact with the scale and sediment while blowing off. The valve, also, has a straight-through blow, and the orifice is of the same size and shape as the pipe. The disc never leaves the seat, thus doing away with the chance of particles lodging there and preventing the valve from properly seating itself when closed, as the disc in passing over the seat brushes off anything that may have lodged there. The valve has no stuffing box. The post or spindle is held back against a heavy pressure gasket by means of a strong coil spring, which also takes up any slight wear there may be, and assures a tight joint, without repacking.

This article is written with the object of pointing out the losses that are attendant upon the blow-off valve being allowed to leak, and the elimination of this contingency will be found worth the consideration of every steam vessel owner. Manufacturers of auxiliaries and accessories are more than keeping pace with the development and improvement of the main steam propelling units, and it is worthy of remark that special notice of this feature has been taken in every reference to the record power plant and marine engineering progress of the past year.



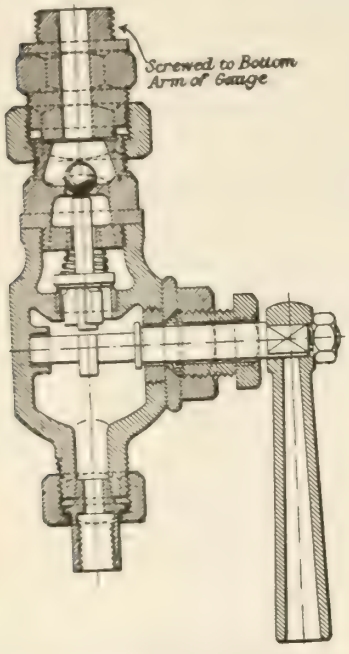
The "Everlasting" Blow-off Valve—Sectional Detail.



The "Everlasting" Blow-off Valve—Sectional Detail.

SHELTERED TRYCOCK FOR GAUGE-GLASSES.

THE illustration shows a new form of trycock for gauge-glass, which is being introduced by J. Hopkinson & Co., Britannia Works, Huddersfield, England. The idea underlying the arrangement of the cock has had other appli-



Sheltered trycock for gauge glasses.

cations than that here shown, but the particular example of it which the cock embodies is both interesting and neat. Although, in accordance with current nomenclature, the fitting is described as a cock, it will be at once noted from the figure that it is in essence a valve. The main feature of the design has reference to the fact that the mushroom valve of the fitting, which forms the valve proper, is backed up and sheltered by a ball-valve above it, and that the operating mechanism is constructed to lift the mushroom valve before the ball-valve. The idea of construction is that as the mushroom valve is always open before steam or water reaches it, when the cock is being used to blow through, it is protected from the cutting action which takes place on an opening valve with pressure behind, so that it remains always tight. Any cutting action which occurs will, of course, be transferred to the ball-valve, but this is of little importance, since this valve is in series with the lower one. In any case, it is obviously better that the cutting should take place on a subsidiary rather than on a main valve.

The details of the cock require little description, as they are well shown in the illustration. The mushroom valve, which is made of Platnam metal, is formed with upper and lower projecting studs, the lower of which is acted on by an eccentric carried by a horizontal spindle, and lifted when the spindle is rotated by its handle. The upper stud on rising, owing to the lifting of the valve, comes in contact with the ball-valve, and opens that in turn. There is a clearance between the top stud and the ball to allow the mushroom valve to open before the ball is acted on. The valve has a controlling spiral spring above it, as shown.

REMARKABLE OIL-ENGINE TRIALS

One of the units of the machinery which is to be installed in the vessels which Messrs. Barclay, Curle, and Co., of Whiteinch, Glasgow, have built for the East Asiatic Company of Copenhagen, has passed successfully through a remarkable trial. The vessel is to have Diesel oil engines of about 3,000 h.p. There will be eight cylinders driving each of two shafts, and the cylinders will be arranged in series on their respective shafts, the design of the installation being such, that, should any one cylinder or more break down, the shaft can be driven by those which remain in working order. The firm have just concluded a 30 days, full load, non-stop (night and day) trial of one of the units. During all the trial the machinery ran without the slightest hitch, and when it was opened out for examination it was found in such perfect condition that it could quite well have been re-started, without adjustment of any kind, on another run of equal length. This is said to be the longest reliability trial of such machinery of which there is any record. It is equivalent to a longer non-stop voyage than is now called for in any sea-going services except on a very few routes. It may be added that the trial was run with ordinary Scotch shale fuel oil, and that the average consumption was 0.35 lb. per i.h.p. per hour.

DREDGING AT THE PANAMA CANAL.

From a recent number of the Canal Record, we learn that the time of operation of the dipper dredge and two of the ladder dredges at work in the Pacific entrance to the canal has been cut one-half, the dipper dredge now operating in two 5-hour shifts daily, and the ladder dredges in two 6-hour shifts. This half-time work is necessary because the dredges can work only from mean to low tide and back, the dipper dredge being incapable of digging more than 40 feet below the water and the ladder dredges 40 and 35 feet.

The dredge Badger has begun work in the basin in front of the lumber wharf in order that the channel up to the dock may be navigable by the time the wharf is completed. The wharf is being constructed on the land, and the basin will be dredged-out up to the front of the new structure.

Borings on the site of the dry dock have been begun to determine the character of the material under the proposed foundation. On the east and west wall line of the dock and the approach basin, holes will be at 100-foot intervals, and along the centre line at 200-foot intervals. The borings on the centre line of the dock will go down to 65 feet below mean tide, and the larger part of the work will be through hard rock. Every third boring on the wall site will be carried down to 45 feet below mean sea level, the others to five feet depth in rock,

Wm. C. Wilson & Co., Toronto, the well-known firm of ship chandlers, now represent more than a dozen of the leading engineering, nautical instrument, hardware and supply firms in England and Scotland. Mr. Wilson has secured orders for his principals to equip each of the three Canadian Government vessels now being built, viz:—S.S. Estevan, Collingwood, and S.S. Bellechasse and S.S. Dollard, Kingston. Clarke, Chapman & Co., Gateshead, are supplying the windlasses, winches, capstans and electric light machinery; the Darlington Forge Co., all the large steel castings, such as the stern posts, spectacle bosses and rudder stems; John Hastie & Co., Greenock, the steering gears; Jones & Lloyd, Cradley Heath, the anchors and chains; Murray, McVinnie & Co., Glasgow, the principal outfit of cooking ranges, utensils and ship chandlery, flags and signal lamps; Richard Buist & Sons, Dundee, the revolving chairs and eccentric motion stands; Hoskins & Son, Ltd., Birmingham, all folding and fixed beds, sofas and crew's beds; Dobbie, McInnes, Ltd., Glasgow, the complete outfit of nautical instruments, sounding machines, chronometers, revolution counters and pressure gauges; Ansell, Jones & Co., Birmingham, the Reid-McFarlands patent steel self-lubricating blocks and sheaves for 45-ton derricks, and also anchor cranes, blocks and sheaves for the three vessels; Wm. McGeoch & Co., Ltd., Glasgow, the complete outfitting of the ships with saloon and cabin lamps, ironmongery and general hardware, and Shanks & Co., Ltd., Barrhead, the w.c. fittings, folding lavatory wash basins and hot water heaters for the baths. The bottoms of all three vessels will be covered with composition manufactured by the Suter Hartman Rahtjens Composition Co., London, Eng.

In addition to their office and storehouse in Toronto, Wm. C. Wilson & Co., have a branch at Lock 24, Welland Canal, (Thorold), where a full line of captains and engineers' supplies is available day or night.

MARINE ENGINEERING of Canada

A monthly journal dealing with the progress and development of Merchant and Naval Marine Engineering, Shipbuilding, the building of Harbors and Docks, and containing a record of the latest and best practice throughout the Sea-going World.

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Vol. II FEBRUARY, 1912 No. 2

GRAND COUNCIL MEETING N. A. M. E. OF CANADA

THE eleventh meeting of the Grand Council National Association of Marine Engineers of Canada was convened at Ottawa in biennial session on Tuesday, Wednesday, Thursday, January 30, 31 and February 1. It was our privelege to meet and associate with many of the representatives and to note the earnestness and enthusiasm which they displayed concerning their Association work. Embracing as it does this section of the whole wide field, "Marine Engineering" welcomes this special opportunity of placing before the National Association Marine Engineers of Canada its relative position. It should be clearly understood by all members of the Association that we have no desire to supplant their "Official Journal," and that it is in no respect our intention to cater to any particular section. In a word, we do not propose to be the official organ of any section, but we do, and that in the most direct, independent and emphatic manner possible, intend that "Marine Engineering of Canada," will be without doubt indispensable to every man in every section of the whole wide sphere of matters marine.

The marine engineers of Canada, whether members of the N.A.M.E., or otherwise, those of Great Britain and every foreign country, covered by our circulation, will each succeeding month find our journal not only interesting and newsy, but at the same time an invaluable help and adjunct to the education, propagation and real uplift of the profession, and in saying so, we make no vain or idle boast, because there is behind the undertaking, reputation, financial backing, constructive and instructive ability to ensure both success and pride of place. From perusal of the pages of the "Official Journal," receipt of which forms a detail of our exchanges, we note some measure of dissatisfaction with the standard set by that periodical, and further, we understand that in Grand Council the question of its effectiveness was debated. The resolve to continue the publication of the "Official Journal," as a proprietary magazine belonging to the National Association of Marine Engineers of Canada, was a wise proceeding, enabling its members to dictate and pursue without "let or hindrance" such policies as they may from time to time deem expedient for the furtherance and upbuilding of the order.

The editorial and advertising pages of Marine Engineering of Canada will be found brimful of easily acquired intelligible help and instruction to every man in the profession, and for the information of the large and general body of the members and prospective members of the N.A.M.E., we have pleasure in stating that in addition to our pages being open for the receipt of contributions which will be paid for at our usual rates, there has been determined with Mr. Morrison, Grand Secy.-Treasurer, an arrangement whereby illustrations appearing in our journal will be available without cost to the Association for reproduction in the Official Journal.

The lengthening day betokens the return of another period of "standing by the throttle," and to the new officers manning the Official Ship, "Grand Council," as well as to each man "on the watch" aboard the ships of Canada's mercantile marine, we extend hearty good wishes, forward progress, immunity from accident, and protection from the many dangers and calamities more or less associated with their calling and profession.

THE PANAMA CANAL.

THE measurable approach of the date of completion of the Panama Canal has brought to light an evident desire on the part of the United States Government to discriminate in favor of vessels built in that country. The prospect of such a contingency has already caused considerable stir among shipping circles in Great Britain and other European countries, and in addition to dissatisfaction being expressed at such an eventuality, claim is made, that in so far as Great Britain is concerned, at least, the step would be a violation of the Hay-Pauncefote Treaty. That this feature is fully realized by those responsible for the foregoing suggested line of action, becomes apparent from the alternative method proposed to secure the desired preference. This is none other than to have a uniform toll rate for all vessels, and a bounty for, and covering the tolls of U.S. shipping.

It may here be pointed out that no discrimination is made in the matter of tolls on the Suez Canal, and we believe that only by adopting a similar plan, will the fullest and most beneficial effects be realized from the Panama Canal. Much, as has been pointed out by us in previous issues, is expected to be attained in the way of increased activity in, and development of Canada's Pacific Coast Ports, although not a few prominent marine men of matured experience are somewhat doubtful about the realization of even the least extravagant predictions made from time to time. Two dollars per ton is the rate charged on the Suez Canal, and the proposed discrimination in favor of American vessels on the Panama Canal amounts to $1.50 per ton.

Fuller consideration of the question, by those responsible, will, we believe, show that a fair field and no favor will meet with not only the largest measure of success to the undertaking, but reflect on, and cover with glory those who have the honor to make the decision.

Notable Personalities of Canada's Merchant Marine

The Part That Shipbuilding, Marine Engineering and Shipping Companies Have Played in Bringing Canada Prominently Before the Eyes of the Civilized World, Has Not, We Believe, Received That Credit of Performance Which is Its Due. We Hope in This Series Dealing With "Notable Personalities of Canada's Merchant Marine," to Show That Those Who Have Bridged The Trackless Ocean to our Shores, and Provided the Facilities for Our Disembarkation, Are Worthy of at Least a Sentimental Regard.

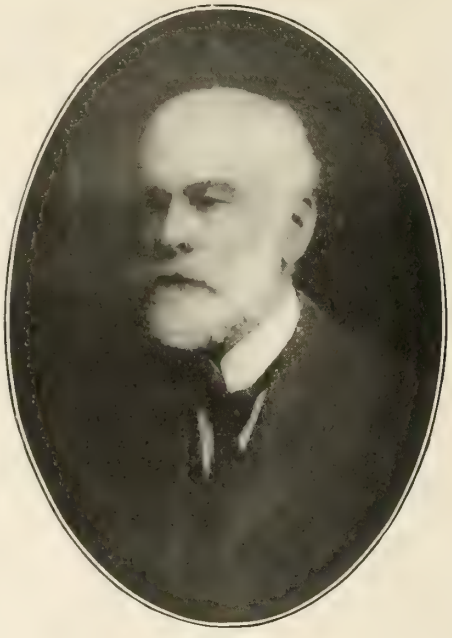
JOHN KENNEDY, C.E.

By L. G. Dennison B.A., BSc*

JOHN KENNEDY, the subject of our sketch, was born in 1838, in Spencerville, Ont., and after concluding his studies at the rural school he attended the Ottawa Grammar School and McGill University. He started his engineering career in the office of Thos. C. Keefer, the well-known consulting engineer of Ottawa, with whom he remained for about seven years, being connected with the construction of the waterworks in Montreal, Hamilton, Ottawa and Toronto. After this, came Mr. Kennedy's first introduction to harbor work. He entered the Montreal Harbor offices as draughtsman, but soon moved to the city surveyor's office, becoming later city surveyor.

Hidden wealth and the possible treasures of the mine appeal to most men at some time, and Mr. Kennedy was no exception; as a result, he decamped to the wilds of the Gatineau and became manager of an iron mining and smelting company. Railway engineering was next on the programme, and the Great Western Railway running between Detroit and Niagara, and having numerous branch lines, employed Mr. Kennedy as resident engineer. From this position, he next rose to be chief engineer of Montreal Harbor Board, and from then until now, his history is that of Montreal's harbor. At that time, the aspect of the latter was not at all as at present; the channel was only 20 feet deep, there was but one short piece of railway which belonged to the G.T.R., and the old wooden wharves were low, and carried only a small fraction of their present trade. There was no guard pier, and as the ice swept across to the Montreal bank of the river, it was necessary to pull down the freight sheds every fall and re-erect them in the spring. The guard pier, started under his supervision about 20 years ago, was built little by little, commencing at the lower end, and the benefits derived from it cannot be too highly appreciated. The wharf track system, completed in 1906, has been laid out in such a way that Montreal has the equal of transportation facilities of any harbor in America.

Mr. Kennedy was a notable figure on the board, which decided upon the plans for the great harbor extension work accomplished in the last ten years. His sight, which had been failing for some time, left him entirely in 1907, and as his health also gave way, he resigned his position. On regaining his health, frequent calls were made upon his services in connection with harbor work, etc., his opinion being held in high esteem. As a consulting engineer he is kept extremely busy, and has just recently arranged the new pier system for the deep water terminal of the I.C.R., Halifax, which is a million dollar job. When asked about Montreal as a winter port, Mr. Kennedy ventured the opinion that as a physical possibility it was quite feasible, but not commercially advantageous at present. He, however, expressed his belief that with the increase in trade and with the probable invention of some electrical appliance which would enable ships to keep the channel during snow storms, it might pay to keep the river open.



JOHN KENNEDY, C.E.

*Canadian Power Gas Machinery, Montreal.

LAUNCH OF A FLOATING DOCK.

AN immense floating dock for the British Admiralty was successfully launched on Thursday, 4th January, from the Wallsend Shipyard of Swan, Hunter, & Wigham Richardson, Ltd. Some idea may be gained of its size when it is known that the ground area it covers is no less than two and a quarter acres, while the total height of the side walls is 66 feet. This is one of three docks that Swan, Hunter & Wigham Richardson, Ltd., are constructing at present for the British Admiralty, for whom they also built a battleship dock several years ago. This last-named was designed for accommodating vessels displacing 17,000 tons, and is stationed at Bermuda.

The dock just launched has nearly twice that lifting capacity, namely, 32,000 tons. In addition to the docks built for the British Admiralty, others have been constructed at the Wallsend shipyard for the Governments of Natal, Southern Nigeria, Spain and Japan, and also a score for British and foreign clients all over the world. The way in which these immense structures can be towed to distant parts is most remarkable. The British Admiralty dock for Bermuda was towed nearly 4,000 miles to its destination. The floating dock for the Natal Government was towed over 8,000 miles to Durban, and a 7,000 ton dock was safely delivered a year or two ago at Callas, the port of Lima, in Peru, the distance from the Wallsend Shipyard being about 11,000 miles. Other docks built by Swan, Hunter & Wigham Richardson, Ltd., have been towed to various European ports, and also to more distant ones, such as Para in Brazil, Port of Spain, in the Island of Trinidad, Egypt, and the West Coast of Africa.

The dock just launched is double-sided, and in its design, the builders have been closely associated with Messrs. Clark & Stanfield, of Westminster. At the bow end, there is a pair of pivoted flying gangways, to give access from one wall to the other. In the walls of the dock is living accommodation for a number of officers and men. A complete telephone system is also installed to give

communication between engine and boiler rooms and different parts of the dock. There are eight steam boilers, which have been constructed at the Neptune Engine Works of the builders. The pumps have been supplied by Messrs. Gwynnes, Ltd. There is also a very complete outfit of steam and hand capstans placed on the walls of the dock to warp vessels into position. The dock is lit by electricity throughout and on the walls are two electric traveling cranes. In order to facilitate rapid repairs, a commodious workshop is provided in one of the walls with an equipment of machine tools and all necessary plant and appliances. Preservative bituminous enamel and solution made by W. Briggs & Sons, Ltd., of Dundee, has been applied to the dock externally and internally.

Altogether, the dock will represent the most complete and efficient means of overhauling and repairing the largest type of modern battleship yet designed or constructed. It is a worthy product of the famous Wallsend Shipyard and a fitting addition to Britain's navy.

Mr. Clarence I. de Sola, Montreal, is the Canadian representative.

THE LATE CAPTAIN WM. WARD.

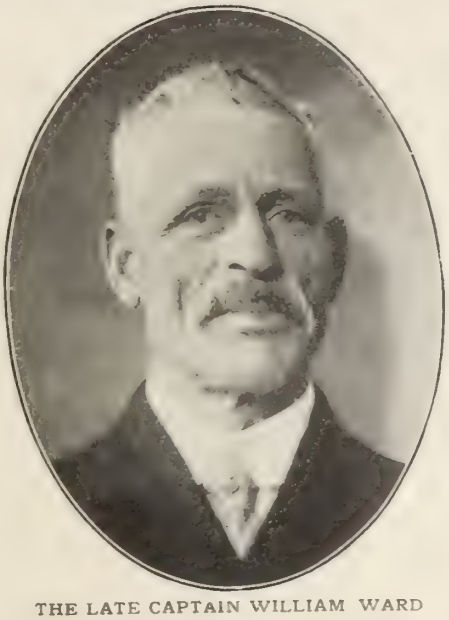
THE veteran life saver, Captain William Ward, died at his home, 68 Brunswick Avenue, Toronto, recently. Captain Ward had the saving of over one hundred and fifty lives to his credit. He was an expert swimmer, and as a reward for his many rescue feats he was made captain of the Dominion life-saving crew in 1881.

He was also a renowned oarsman, and at one time he held the single skiff championship of America. At the age of eleven he was coxswain of the first four-oared shell in Canada, and took part in contests in places as far distant as Lachine, Que. At one time, in a race at Oswego, when all the other shells were swamped, he held the steering ropes with his teeth and baled out the shell with his hands.

He possessed the Royal Humane Society's medal, only one of which is given each year for the most conspicuous act of bravery; the society's silver medal, the first ever given in Canada; the society's silver clasp for life saving; and many documents and parchments. As far back as 1875 he was presented by the Toronto Gun Club with a massive gold watch and chain for bravery in rescuing the crew of the schooner Olive Branch, wrecked on Toronto Island.

The deceased mariner was the sole survivor of a tragedy of Toronto Harbor with great elements of pathos. At sixteen years of age he was accustomed to row his five sisters across to the city for school. One stormy afternoon, as the little party of six were returning home, a squall arose. When about half the distance had been covered, the wind became fiercer, and with the choppy sea upset the little craft. All but William were drowned, and he was found, unconscious, on the bottom of the upturned boat, to which he had been holding his helpless sisters.

Captain Ward was born on Toronto Island sixty-five years ago, his father, who came out from Yarmouth, England, having settled there in 1830. The spot where the Ward house on the Island now stands is almost half a mile north of the site of the original Ward home. The



THE LATE CAPTAIN WILLIAM WARD

waters of the lake have covered the latter for many years, washing away the beach and forcing the removal of the home further inland on the Island more than once.

SHELTERS FOR SHIPWRECK VICTIMS.

The Government steamer Newington, recently equipped with wireless, sailed from Victoria with five shelter huts on board for erection at various points on the west coast of Vancouver Island, westward of Friendly Cove, and for service as aids to shipwrecked mariners. One will be placed at Bajo Point, one on each side of Cape Cook, one on Rugget Point, north of Quatsino Sound, and one on Cape Palmerston, immediately south of San Josef Bay. The huts are 8 by 8 feet, provided with a window and door. A small stove and an axe, with a supply of provisions hermetically sealed, will be placed in each. To attract attention, a red cross will be placed above each hut. A chart and printed directions showing how succor can most readily be obtained, printed in English, French and German, will be placed in each. These directions, different in each hut, show where the nearest settlement is located. For instance, that placed in the hut at Cape Palmerston, says: "You are at the place marked with a red square on the chart. To the northward, a distance of seven miles along the shore, is San Josef Bay settlement, where succor may be had, and from which place a good road leads to steamboat connection on Quatsino Sound, where steamers call about the 7th and 20th of each month. In this hut are 30 pounds of pilot bread, 25 pounds of corned beef, 5 pounds of tea and matches, heremetically sealed." The Cape Cook shelter has a chart and directions telling how to reach Entrance Light Island by boat and Quatsino by land, and all information regarding trails, steamship connection, etc.

One of the shelter huts is being placed close to where the British ship King David went ashore a few years ago. Several lives were lost as a result of a boat crew starting for Cape Beale, when Nootka lay but seven or eight miles away, and the shipwrecked company remained for about six weeks awaiting rescue. Had the shelter hut been established then, they would have readily found their way by the trail to Friendly Cove settlement and the loss of life would have been averted.

The Government steamer Leebro is now on the way to the Ballinacs with material and machinery for the reconstruction of the lighthouse, dwelling and fog alarm station at that point. The lighthouse is being moved to the north end of the island, where greater visibility is provided. Machinery is being taken to double the capacity of the fog alarm. Mr. Fairful, supervising foreman of the department, has gone to the Ballinacs to superintend this work.

The Government steamer Quadra, Captain McPherson, has left on a long cruise to northern B. C. waters, to overhaul and recharge the northern beacons, and take stores and supplies to the light stations. Machinery is on the way for the construction of a fog bell at Charles Point, at the entrance to Prince Rupert harbor.

CANADA REWARDS U. S. SAILORS.

The Canadian Government, through British Ambassador Bryce, has acknowledged an instance of heroism by presents to the commanding officer and men of the U. S. revenue cutter Gresham, for saving the lives of five Canadians from the schooner S. A. Fownes, wrecked off the coast of Massachusetts, December 16, 1910. Captain Preston H. Uberroff and Gunner Carl H. Johannesen, both formerly of the Gresham, were offered gold watches and fifty dollars will be divided among the enlished men. Secretary of State Knox will ask Congress to permit Capt. Uberroff and Gunner Johannesen to accept the watches.

PANAMA CANAL FORTS.

THE forts of the Panama canal, and the batteries comprising them, will be named in accordance with the following schedule. The military reservations at the Pacific terminus will be named Fort Grant and Fort Amador, the first in honor of Gen. Ulysses S. Grant, U. S. A., President of the United States from 1869 to 1877, who died on July 23, 1885, and the second in honor of Dr. Manuel Amador Guerrero, first President of the Republic of Panama, who died on May 2, 1909. The reservations at the Atlantic terminus will be named Fort Sherman, Fort Randolph, and Fort DeLesseps, in honor of Gen. William T. Sherman, U.S.A., who died February 14, 1891; Major-General Wallace F. Randolph, U.S.A., who died September 9, 1910, and Count Ferdinand DeLesseps, promoter of the Panama canal, who died December 7, 1894.

Fort Grant Military Reservation.

Battery Newton—In honor of Maj. Gen. John Newton, U.S. Volunteers (Brigadier General, Chief of Engineers, U. S.A.), who died May 1, 1895.

Battery Merritt—In honor of Maj. Gen. Wesley Merritt, U.S.A., who died December 3, 1910.

Battery Warren—In honor of Maj. Gen. Gouverneur K. Warren, U.S. Vols. (Lieutenant-Colonel, Corps of Engineers, U.S.A.), who died August 8, 1882.

Battery Buell—In honor of Maj. Gen. Don Carlos Buell, U.S. Vols. (Colonel, Assistant Adjutant General, U.S.A.), who died November 19, 1898.

Battery Burnside—In honor of Maj. Gen. Ambrose E. Burnside, U.S. Vols. (First Lieutenant, Third U.S. Artillery), who died September 13, 1881.

Battery Parke—In honor of Maj. Gen. John G. Parke, U.S. Vols. (Colonel, Corps of Engineers, U.S.A.), who died December 16, 1900.

Fort Amador Military Reservation.

Battery Smith—In honor of Maj. Gen. Charles F. Smith, U.S. Vols. (Colonel, Third U.S. Infantry), who died April 25, 1862.

Fort Sherman Military Reservation.

Battery Howard—In honor of Maj. Gen. Oliver O. Howard, U.S.A., who died October 26, 1909.

Battery Stanley—In honor of Maj. Gen. David S. Stanley, U.S. Vols. (Brigadier General, U.S.A.), who died March 13, 1902.

Battery Mower—In honor of Maj. Gen. Joseph A. Mower, U.S. Vols. (Colonel, Twenty-fifth Infantry), who died January 6, 1870.

Battery Kilpatrick—In honor of Maj. Gen. Judson Kilpatrick, U.S. Vols. (Captain, First Artillery), who died December 2, 1881.

Fort Randolph Military Reservation.

Battery Tidball—In honor of Brig. Gen. John C. Tidball, U.S.A., who died May 15, 1906.

Battery Webb—In honor of Brevet Maj. Gen. Alexander S. Webb, U.S.A. (Lieutenant-Colonel, 44th U.S. Infantry), who died February 12, 1911.

Battery Weed—In honor of Brig. Gen. Stephen H. Weed, U.S. Volunteers (Captain, 5th U.S. Artillery), who was killed in action, July 2, 1863, at Gettysburg, Pa.

Fort DeLesseps Military Reservation.

Battery Morgan—In honor of Brig. Gen. Charles H. Morgan, U.S. Volunteers (Major 4th Artillery), who died December 20, 1875.

MONEL METAL CONDENSER TUBES

In marine work there has always been a need for a condenser tube that has a reasonably high coefficient of heat transfer and could successfully withstand the corrosive action of the salt water used for cooling purposes. The tests made on a Monel metal condenser tube by Mr. George A. Orrok, and presented in a paper on the "Transmission of Heat in Surface Condensation," read before the American Society of Mechanical Engineers, are, therefore, of considerable interest, as the Monel metal tube showed a coefficient of heat transfer of .75 in comparison to copper's 1. It is claimed however, that the great advantage of the Monel metal tube is that it is less corrodible than bronze, as strong as steel, while its finish is similar to that of pure nickel. Brass condenser tubes for protection are often tinned on the inside or both sides. Not only does this lower the coefficient of heat transfer, but, also, bi-metallic tubes are apt to split. The Monel metal tube, however, is said to be free from troubles of this kind.

IMPROVED MARINE TURBINES.

The new channel steamer which is being built at Dumbarton, Scotland, for the Clyde service of the Turbine Steamers (Limited) is to be named Queen Alexandra, and is to succeed the vessel of that name recently sold to the Canadian Pacific Railway Co. for service on the Pacific Coast and now named Princess Patricia. The first Queen Alexandra was the second turbine steamer built for mercantile purposes. Her successor is practically a duplicate, so far as general design is concerned, but her machinery-room equipment will include many improvements suggested by experience with the earlier vessel and her sister ship the King Edward. She will have three Parsons turbines driving three shafts, and there will be a considerable increase in the power of the two astern turbines, so that the vessel will be much more easily manoeuvred in narrow waters. As compared with paddle steamers, the first turbines were somewhat difficult to handle at piers and in confined channels, and in order to overcome this disadvantage more powerful reversing turbines are now being provided.



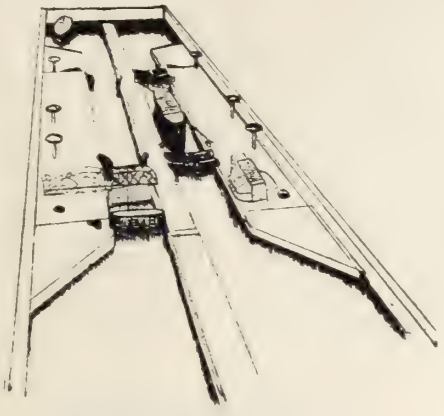
PANAMA ISTHMUS WITH COMPLETED CANAL.

GOVERNMENT ESTIMATES.

Estimates totalling nearly $150,000,000 have been tabled at Ottawa by the Hon. W. T. White, Minister of Finance. For the Welland ship canal there is a vote of $50,000 for surveys, while there is no vote at all for the Georgian Bay ship canal. Any policy which the Government has with regard to these projects will await announcement in the supplementary estimates. Capital expenditure on public works provides for a total of $5,185,000; the main items being Ottawa departmental buildings, $780,000; Port Arthur and Fort William Harbor and River improvements, $1,000,000; Quebec harbor, $716,000; St. John harbor, $1,000,000; Tiffin harbor, $137,000; Victoria harbor Ont., $160,000; Victoria and Vancouver harbors, B.C., $500,000 each, and $900,000 for docks and wharves at Halifax.

PANAMA CANAL AND AMERICAN SHIPPING.

The special message of President Taft to Congress raises a question of great interest to British shipping. The President takes occasion to urge the necessity for the establishment of preferential rates for American shipping passing through the Panama canal. While this is no new question, it is now raised for the first time in the arena of practical commerce, inasmuch as it is made a legislative proposition at a time when the canal is approaching completion. The argument of President Taft is founded on the specious plea that foreign governments subsidize their own merchant vessels, and that therefore the remission of tolls in the canal could not be held to be discrimination in favor of America. It would, however, undoubtedly be discrimination if made part of the administrative action of the Canal Commission, which is a Government department of the United States. The dressing of phrases will not alter the sober character of facts. Article 3 of the treaty between Great Britain and the United States "to facilitate the construction of a ship canal to connect the Atlantic and Pacific Oceans," provides that "the Canal shall be free and open in time of war and in time of peace to the vessels of commerce and of war of all nations on terms of entire equality, so that there shall be no discrimination against any nation or its citizens or subjects in respect of the conditions or charges of traffic or otherwise." To all ordinary intelligence it must appear that discrimination in favor of one nation is discrimination against all other nations.



PANAMA CANAL LOCKS.

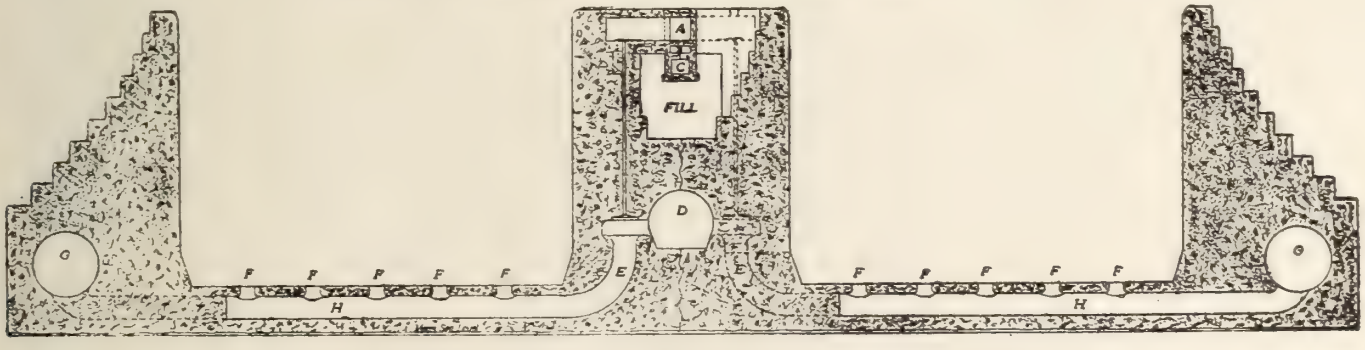
Therefore, if Congress legislates as President Taft asks, it will do so at variance with the Hay-Pauncefote Convention. That it is not the President's intention to do this we readily believe, and he may read differently the clauses of the treaty; but they must be remembered, and the terms and spirit of the understanding respected.—G. W. H.

SEALING STEAMER "NASCOPIE."

THE new sealing steamer, "Nascopie," underwent a very successful trial trip on Wednesday, the 24th January, off the Tyne, England. She has been built and engined at the Neptune Works of Swan, Hunter & Wigham Richardson, Ltd., to the order of Job Bros., Liverpool, in conjunction with the Hudson Bay Co., and will be employed in the Newfoundland Seal Fishery and in the Company's work in the Bay, for which purposes she is very completely fitted out. The hull, of steel, is strongly built, and the form, strength and details of construction embody the latest practice, for vessels intended to work amongst thick ice. Her stem is so formed that when charging ice, she will glide upon it and crush it under her weight. The machinery, shafting and propellers have all been made specially heavy in order to cope with the shocks likely to be received amongst the ice.

The steamer is 285 feet in length by 43½ feet beam, by 29 feet 9 inches deep and will carry 2,500 tons deadweight. The machinery consists of a set of triple expansion engines, supplied with steam by two boilers working under Howdens forced draught. On the trial trip, although the sea was rough and the weather decidedly unfavorable, a speed of over 14 knots was attained, being considerably in excess of the contract requirements. She has been constructed to attain the highest class at Lloyds, and has comfortable accommodation for the navigating staff, engineering staff and crew. She will also, when necessary, accommodate a large number of sealers.

The vessel has been built under the superintendence of Messrs. G. S. Goodwin & Co., Consulting Engineers, Liverpool, of which firm Mr. A. Hamilton and Mr. Adamson were present at the trial trip. The owners were represented by Messrs. R. & T.B. Job, of Liverpool and Newfoundland, and Mr. Ingram, of the Hudson Bay Co., and the Builders by their Directors, Mr. Christie and Mr. G. F. Tweedy.



Cross Section of Lock Chamber and Walls of Locks.

A—Passageway for operators.
B—Gallery for electric wires.
C—Drainage gallery.
D—Culvert in center wall.
E—These culverts run under the lock floor and alternate with those from sidewalls.
F—Wells opening from lateral culverts into lock chamber.
G—Culvert in sidewalls.
H—Lateral culverts

THE PANAMA CANAL.

READERS' NOTES AND VIEWPOINT

Devoted to Brief Article Contributions Covering Experiences, Correspondence and Comment on Matters Marine. We Pay for Suitable Material.

SIGHT-FEED LUBRICATION OPERATION.

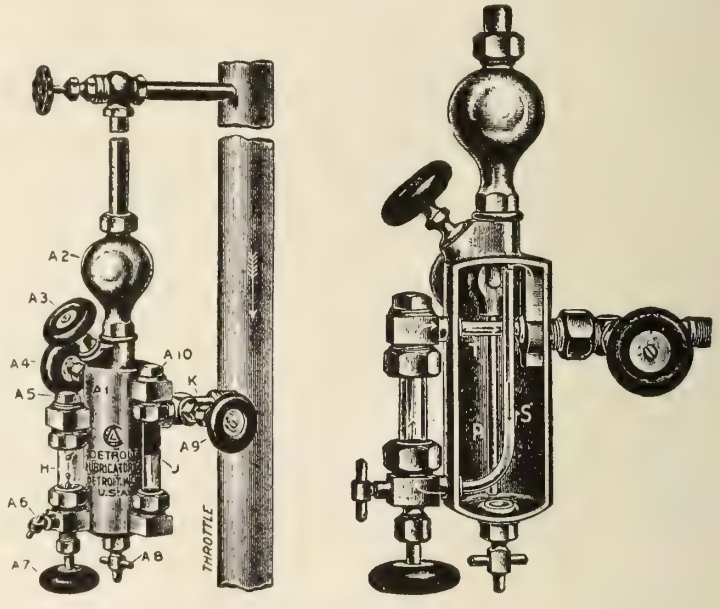
By Calliope.

THE operation of Sight-feed Lubricators depends upon the action of natural laws, therefore unless some part is injured or defective, or some mistake is made in attaching or operating, they must work as positively and as certainly as water will run down an incline. By reference to the accompanying cuts, detail of operation can be easily understood. The pipe P, shown in sectional cut on the right, connects with a passage from condenser A-2, so that as soon as the water feed valve A-4 is opened, the water in the condenser will pass down the pipe P, to the bottom of the body of the lubricator, and being heavier than oil, will stay at the bottom, the oil floating above it. The pipe S leads to the lower sight-feed arm from the upper part of the body of the lubricator.

The body A-1 is filled with oil. Steam from the main steampipe passes in the connecting pipes above the lubricator and condenses, filling the condenser A-2 and part of the pipe above it with water. The steam also passes into the support arm and through the internal tube T into the sight-feed glass, where it condenses, filling the glass with water. As soon as the valve A-4 is opened, the oil in the body of the lubricator is subjected to the pressure of the column of water extending through the pipe P, the condenser and part of the pipe above it, amounting to about 2 lbs. to the square inch, and in addition to the pressure of the steam above the water, amounting to say 100 lbs. to the square inch, or a total pressure of about 102 lbs. to the square inch. This we may call the positive pressure. Liquids communicate pressure equally in all directions, so the oil in the body of the lubricator will press in every direction with a force of about 102 lbs. to the square inch. It will therefore press down through the tube S with this force of 102 lbs. to the square inch. Then, if the valve A-7 is opened, a force acting in the opposite direction is encountered, which we may call the back pressure. When the lubricator is connected as shown, this back pressure will consist of the column of water in the sight-feed glass, and in addition, the steam pressure back of this column entering through the support arm, and amounting to 100 lbs. to the square inch.

The positive steam pressure being just the same as the back steam pressure, these two forces will neutralize each other, and we have left, the positive pressure of the column of water extending through the pipe P, the condenser and part of the pipe above it, and the back pressure of the column of water in the sight-feed glass. As the latter is much less than the positive pressure, the drop of oil is forced through the nozzle. As soon as it leaves the nozzle it is no longer acted upon by the positive pressure, and it rises through the water in the glass from the force of gravity, it being lighter than the water. After rising through the sight-feed glass it floats through the tube T and through the support arm into the main steampipe and goes with the current of steam to the steam chest and cylinder. The positive pressure must always be greater than the back pressure, or the lubricator will not work. For instance, if a lubricator be connected to a horizontal steampipe by being suspended below it, the back pressure would be greatly increased, and in order to get sufficient positive pressure the condensing pipe should rise 18 in. to 24 in. above the horizontal steampipe and then descend to the condenser. This will give a column of water for positive pressure higher than the column of water which acts as back pressure.

The writer is indebted to the Detroit Lubricator Co., for the cuts accompanying this article.



The Detroit Sight Feed Lubricator.

ELECTRICAL MACHINERY, ITS CARE AND HANDLING.

By Roderick Grant, Toronto.

WE are aware how difficult it is to get engineers or attendants, who have had little or no electrical experience, to appreciate how easily a serious fault may develop from what might appear to be a trifling cause, so we would urge the necessity of giving to the brushes, etc., the most careful attention and of taking prompt action to remedy any condition that might conceivably cause trouble. It augurs well if a highly polished dark skin forms on the commutator surface, indicating, as it does, that there is the minimum of wear. The surface then, on no account should be disturbed with sandpaper, for an occasional wipe with a clean dry rag will usually prove to be all the treatment required. It is sometimes advantageous, however, to wipe the commutator with an oiled rag, especially if the brushes become noisy. This treatment also removes any gummy substance present, and which on no account should be allowed to accumulate.

Defective Insulation Due to Oil Leakage.

At this time of day, when the disastrous results to insulation from moisture or dampness are so well known, it is perhaps needless to insist on the precautions to be observed in that direction, but there is another source from which impaired insulation results equal-

ly disastrous, and we regret to say of much too common occurrence. We refer to the indiscriminate use of lubricating oil. It is of course necessary that all bearings should be thoroughly lubricated, but great care should be taken to see that the oil does not overflow, run along the shaft or collect about the frame where it might affect the windings. In most modern machines, the armature is protected by shields on the shaft which arrest the creeping oil before getting to the windings, and manufacturers have given considerable attention to the design of lubricators, to insure that no splashing takes place. The trouble to which we refer, is in most cases, simply due to flooding, and not only is it wasteful but at the same time positively dangerous.

Bearing Lubrication and Effects of Wear.

Electric motors and generators are as a rule provided with ring lubricators which under favorable conditions give perfect service. An occasional examination should be made, however, to ensure that they are working freely, as a slight deposit of sediment in the oil reservoir will often prevent the ring from being carried round on the shaft. Further, it is not unusual for a ring to spring from its seat by increased vibration, and to take up an ineffective position. This trouble can be guarded against by soldering a piece of stout wire across the slot in the bearing wherein the ring lies. Only good clean mineral oil should be used, perfectly free from grit, and the reservoirs should, periodically be thoroughly cleaned out.

Perhaps the chief importance of keeping the bearings in good order lies in the fact that if any wear takes place the armature is thrown out of centre, and the pull exerted by the pole piece toward which it lies becomes tremendous as the neutralizing influence of the opposite pole is lessened. This not only disturbs the magnetic and electrical balance, causing undue heating of the armature and sparking at the brushes, but the wear of the bearings is greatly accelerated until finally the armature rubs on the pole face, damaging more or less severely the insulation. The necessity therefore of keeping the armature exactly central or equidistant from the field magnets will be readily appreciated and frequent inspection should be made in order to ascertain if any wear is taking place. To this purpose, it is advisable where several machines are in use, for the engineer to have at hand a number of flexible strips of wood of the required lengths and thickness. These may be conveniently kept together by means of a ring passing through a hole near one end. Each strip can be inserted in turn and the exact amount of clearance at all points thus readily determined. Although this method is the more reliable the same object may be accomplished by holding a lamp at one end of the armature, when the amount of clearance may be seen from the opposite end. It is possible, however, that the armature may be out of centre without any appreciable wear having taken place at the bearing. A bent shaft, the shifting of one of the field magnets, or a loose armature winding would each contribute to this. In any case, it is no difficult matter to determine exactly what is at fault.

The bearing at the driving or pulley end of the shaft, owing to the extra strain, is subject to most wear. This if once started, for reasons already stated, develops rapidly, so that, on the least indication of this trouble, preparations should be promptly made to have the fault remedied at a time that will cause least inconvenience. The danger of having a bent shaft is not so great, as not only are special precautions taken by all reliable makers to obviate such an occurrence, but it is only under certain conditions that such a thing would be likely to happen. For instance, if the armature were unusually long, the danger would be increased; or if by any chance the machine were allowed to race and exceed its normal rate of speed, the centrifugal force would exert a tendency more or less severe in that direction.

In spite of the precautions that are taken in dynamo and motor design, vibration will sometimes cause a slight displacement of the pole pieces and of the field magnet coils. The measures to be adopted under such circumstances will entirely depend on the manner in which these parts have been fixed, but on the location of the fault, there is seldom much trouble experienced in making the necessary adjustment. Projecting coils on the armature should be pressed carefully and firmly into position and if necessary held by extra binding wire.

THE WORLD'S WARSHIPS.

NAVAL shipbuilders launched 28 armored vessels of the Dreadnought type, representing an aggregate displacement of 638,872 tons and a total value of, roughly, $350,000,000. On the stocks or about to be laid down are 43 similar ships, representing an aggregate displacement of 959,830 tons and a total value of about $537,500,000. The ships launched in 1911 from British yards represented 178,050 tons, or $100,000,000. No other country's output approaches these figures. If we add the four battleships for whose design and construction in Russia, Messrs. John Brown & Co., of Sheffield and Clydebank, are understood to be responsible, the totals are 270,050 tons and $150,000,000. Great Britain's position in the world of naval shipbuilding looks still better when the world's ships in progress—those launched and laid down in 1911 as well as the others shortly to be laid down—are taken into account Including vessels in course of construction abroad under British direction and vessels being built in foreign countries to British designs the proportions are 879,880 tons and $462,500,000 The work actually being done in the United Kingdom—excluding of course vessels launched in 1910 and not yet commissioned—represents 509,000 tons and $262,500,000 The only foreign country which is doing or directing armoured construction for a foreign power is the United States which in 1911 launched the battleships Rivadavia and Moreno for the Argentine. Details of the world's armoured vessels follow :

Armored Ships—Great Britain.

Vessel.	Type.	Tons Disp.	H.P.
Conqueror	Battleship	22,500	27,000
Monarch	Battleship	22,500	27,000
Thunderer	Battleship	22,500	27,000
Princes Royal	Armd. cruiser	26,350	70,000
Australia	Armd. cruiser	18,800	43,000
New-Zealand	Armd. cruiser	18,800	43,000
King George V.	Battleship	23,300	31,000
Centurion	Battleship	23,300	31,000
		178,050	299,000

Battleships like the King George V. are on the stocks at Greenock and Birkenhead, and battleships of 25,000 tons are about to be laid down at Portsmouth, Devonport, Barrow, and Dalmuir. An armored cruiser like the Princess Royal is on the stocks at Jarrow. The aggregate displacement of these vessels is 173,450 tons.

Germany.

Vessel.	Type.	Tons Disp.	H.P.
Kaiser	Battleship	22,400	29,000
Fr. der Grosse	Battleship	22,400	29,000
Kaiserin	Battleship	23,500	31,000
Groeben	Armd. cruiser	21,500	68,000
		90,200	157,000

Five battleships and two armored cruisers are on the stocks -total displacement, 102,000 tons.

France.

Vessel	Type.	Tons Disp.	H.P.
Jean Bart	Battleship	23,096	28,000
Courbet	Battleship	23,096	28,000
		46,192	56,000

The battleship France is on the stocks at Toulon, and the battleship Paris at St. Nazaire total displacement, 48,000 tons.

Russia.

Vessel.	Type.	Tons Disp.	H.P.
Sevastopol	Battleship	23,000	42,000
Petropaulovsk	Battleship	23,000	42,000
Gangut	Battleship	23,000	42,000
Poltava	Battleship	23,000	42,000
		92,000	168,000

It is difficult to say exactly how many Russian armored vessels are projected, but probably between the Black Sea and the Baltic there are six -total displacement, about 150,000 tons

Italy.

Vessel.	Type.	Tons Disp.	H.P.
Giulio Cesare	Battleship	21,500	30,000
Conte-di-Cavo'r	Battleship	21,500	30,000
Leon. da-Vinci	Battleship	21,500	30,000
		61,500	90,000

Two armored vessels are to be laid down in 1912 total displacement, about 48,000 tons.

Austria-Hungary.

Vessel	Type.	Tons Disp.	H.P.
Viribus Unitis	Battleship	19,600	25,000
Kais. Fra. Josef	Battleship	19,600	25,000
		39,200	50,000

Two battleships are to be laid down early in 1912 total displacement, about 42,000 tons.

MARINE NEWS FROM EVERY SOURCE

Forming a Concise Record of What is Being Done and Happening at Home and Abroad, and Providing a Means Whereby Readers are Kept in Intimate Touch with Marine Progress, Development, Etc.

Canada

Toronto, Ont.—The Shipmasters' Association held its annual meeting in their club rooms recently, and elected officers for the year 1912 as follows:—Master, Captain James Mann; First Officer, Commodore C. J. Smith; Secretary-Treasurer, Captain Jackson; Pilot, Captain Cartwright; Watchman, Captain McGlennon; Delegates to Grand Council, Captains Mann and McGlennon.

Victoria, B. C.—Capt. J. T. Walbran, of the Marine and Fisheries Department, has been appointed marine lecturer by the Dominion Government. Lectures on marine subjects will be given by Capt. Walbran on Tuesday and Thursday of each week.

Collingwood.—Two United States lines of steamers plying into this port during the excursion season, June to September, is the outlook for the summer of 1912. Ex-Mayor H. A. Currie and Mr. M. P. Byrnes, president of the Board of Trade, returned recently from Chicago with this promising news. The object of their visit was to have two interviews, one with the management of the Northern Michigan Transportation Co., and the other with the Goodrich S. S. Co. Both were secured and the propositions in view talked over carefully and at length.

The Northern Michigan Co. propose to operate their steamer Missouri, and the Goodrich line, their steamer Arizona, between Chicago and Collingwood. The run proopsed for both vessels is to Mackinac, thence on to Collingwood, touching on either the eastbound or westbound trip, Killarney and some of the intermediate ports to the Soo. One of the companies, the Goodrich, stated positively that their steamer would begin the season's sailings on June 22nd, while the other said practically the same thing. Messrs. Currie and Byrnes gave the companies full information respecting the depth of water in the harbor, the wharf accommodation, the points of interest in and about the town.

The Arizona and Missouri are large, modern steamers with splendid passenger accommodation. They have been trading between Chicago and Mackinac for some years, and enjoy a large patronage, especially from the Western and Southwestern States. It is to retain their business and meet the demands of their patrons that the proposed change is being made in their running arrangements. Collingwood will doubtless benefit from the calls of these steamers, as it is intended that their passengers will be privileged to remain in town for some time each trip.

Owen Sound.—An enthusiastic meeting of the town council and board of trade, Owen Sound, was held recently to deal with the proposed dry-dock project which has been before the people for the past year. The proposal, when it came before the people last spring, was endorsed almost unanimously. The town voted to take $50,000 in common stock and grant a cash bonus of a similar amount on an enterprise which would involve an expenditure of a million dollars. The revised proposition involves a million and a half expenditure, and the town is asked to revote the $50,000 for common stock and make an annual subsidy of $10,000 for twenty years, with the usual exemption from taxation, excepting school taxes, with a minimum assessment of half a million dollars. Mr. Edward Box, of London, England, one of the most prominent engineers in naval and marine undertakings, is the promoter of the proposition, and the plans, which will be submitted at an early date to the Government, with a view to being endorsed under the Dry-dock Subsidy Act, are most minute in detail. They include a 600-foot dry-dock, capable of being extended at a small additional outlay, and a floating dock capable of handling boats up to 400 feet in length.

C. G. S. Lady Laurier.—While steaming out through Barrington Passage, the Government steamer Lady Laurier touched bottom, and made water so fast that it became necessary to beach her. The Lady Laurier was built at Paisley, in 1902, and has a gross tonnage of 1051, with a registered tonnage of 413 tons.

Halifax.—The Halifax branch of the National Association of Marine engineers, at a meeting recently, adopted a resolution asking for the support of the whole Association in an endeavor to secure the cancellation of the Order-in-Council passed by the Dominion Government allowing Norwegian and foreign ships the same privilege as British bottoms in the coastwise trade. The council voted $25 to start a fund to carry out their views and a subscription list was opened.

Allan Line Changes.—The talk of the Allan Line making Plymouth, Southampton or Dartmouth a port of call for its direct London service received confirmation from Mr. Hugh A. Allan, who expressly points out, however, that such action would need the sanction of the Dominion Government in the case of its steamers, which now make Havre their final port of departure westward and first port of call eastward. The service was specially subsidized as a direct French-Canadian service, and the business has developed rapidly since regular sailings have replaced the spasmodic departures which used to take place. The decision of the Cunard line to call at Southampton with their London steamers is another indication of coming steamship developments.

C.N.R. Steamships.—The Canadian Northern Railway is making an effort to charter one, or if possible, two liners of the "one-class" type to enable them to give a weekly service from Avonmouth to Canada in conjunction with the Royal steamers, and also to carry the whole of their immigration traffic from the old country to points on their own railway. Mr. D. B. Hanna, third vice-president of the C.N.R., who returned from a business trip to England recently, said that one of his objects had been to secure supplementary steamers, but that so far he had been unsuccessful. He endeavored first to purchase suitable boats, and then to charter them. He met with no success in the first case, but negotiations are still pending for the charter of a single vessel. Both steerage and second saloon on the "Royals" are booked up until April, and unless additional steamers are secured a considerable portion of the business will have to be transferred to another line.

Port Arthur.—Working continuously at repairs to the big freighters which, during the season of navigation, ply the great lakes, the Western Dry Dock and Shipbuilding company's plant has been steadily employing 300 men all winter, and during this extremely cold weather work is still being carried on. Two of the Merchants Mutual Line boats, the Renvoyle and the Pellatt, are on the stocks undergoing general hull repairs, and as soon as they are floated the Ames will take her turn. It is expected that the Trevor also will be placed for repairs, in order that she may be made ship-shape so as to go into commission in the spring. The Trevor was wrecked in the fall of 1910 on some shoals near Isle Royale. After lying there all that winter and most of the next summer, being abandoned by the steel trust that owned her, she was purchased as a specu-

lation by Mr. F. S. Wiley, of Port Arthur, the Canadian Towing and Wrecking company being the successful contractors for the work. Construction work on the plant of the Western Dry Dock and Shipbuilding Company has ceased until the spring. The boiler shop is finished.

New Cunard Liners.—The two new Cunard liners to be built by Scott's Shipbuilding & Engineering Co., of Greenock, will each be 538 feet in length with a gross tonnage of 13,000 tons. They will be twin-screw, and are intended for the Canadian trade. Accommodation will be provided for 500 second-class and 1,500 third-class passengers.

Vancouver, B.C.—To stimulate Vancouver's trade relations with Mexico and arrange for an oftener and more regular steamer service at the earliest moment possible, the local board of trade has despatched a telegram to the Deputy Minister of Trade and Commerce at Ottawa, urging a government subsidy for the Canadian-Mexican Steam ship service with the least delay possible. The Board of Trade also requests the department to grant permission to the steamship company to call at San Francisco both coming and going, adding "while the board recognizes the principle involved, it considers that special conditions warrant the action recommended. In order to make this service a success sailings must be frequent and regular. If subsidized the company will run three steamers between this port and Mexico in regular three-weekly intervals.

Collingwood, Ont.—The annual meeting of the Collingwood Shipbuilding Company was held on February 1, when the directorate of last year was re-elected. The personnel is as follows:—President, Capt. Alex. McDougall, Duluth; vice-president, Thomas Long, Toronto; secretary-treasurer, S. H. Lindsay, Collingwood. H. B. Smith, Owen Sound; Capt. P. M. Campbell, M. P. Byrnes, Collingwood, and S. Dyment, Barrie. The sale of the company's plant to the Forget interests is not confirmed, but it is admitted that negotiations are yet on.

Victoria, B.C.—One of the most interesting of the marine lectures given by Capt. J. T. Walbran, of the Marine and Fisheries Department, was that on "Shipbuilding," which he treated recently, before a large audience in the room set aside for the meetings on the third floor of the post office. The lectures which are given every Tuesday and Friday evenings are becoming quite popular, and it is possible that the room in which the mariners now gather will be found to be too small. Capt. Walbran, by means of a number of large pictures, gave a full description of the different timbers and plates used in both wooden and iron shipbuilding, their uses and technical names. He went into details on the subject and showed the audience the work from the time the keel of a steamer was laid until she was ready for service. The captain, who is one of the best informed seamen on the coast, made the address interesting by illustrating all his remarks with pictures, which are supplied by the marine department at Ottawa.

GERMANY AND THE PANAMA CANAL.

Germans are beginning to interest themselves more actively from day to day in what will follow the opening of the Panama Canal. It is announced that the Hamburg-American line has given to the Weser Shipyard at Bremen, an order for a special type of Panama Canal vessel. The Hamburg-American company stated, in its annual report, that its shipbuilding programme would require to be considerably increased in view of the expected heavy increase of traffic through the canal. The Berliner Neueste Nachrichten makes an editorial appeal to the United States Government to be moderate in fixing the canal charges. It says the Isthmian waterway is destined before long to offer to the Suez Canal the sharpest sort of competition

STEAM VESSELS REMOVED FROM THE CANADIAN REGISTER, DECEMBER, 1911.

Official No.	Name of ship.	Port of Registry.	Net Tonnage.	Cause assigned.	Date of loss
107,883	Athens	Victoria	8	Stranded	Feb. 2, 1911.
72,666	Beatrice	Vancouver	74	Sunk	
96,713	Circassian	Ottawa	5	Out of existence	
83,051	Clipper	Ottawa	3	Out of existence	
100,078	D. W. Gordon	Victoria	6	Burnt	June 17, 1911.
85,304	Eva	Montreal	4	Burnt	
83,411	Eva	Port Hope	12	Burnt	
94,089	Eva Belle	Collingwood	7	Burnt 15 yrs. ago.	
58,826	Evangeline	Montreal	16	Burnt	
	Elswood	Kingston	17	Out of existence.	
111,988	Fern	Vancouver	17	Burnt	Nov. 27, 1910.
94,719	Governor Morton	Port Stanley	10	Burnt	Dec. 2, 1911.
85,711	Grenda	Prescott	43	Broken up	
73,953	Harvey Neelon	St. Catharines	47	Burnt	1906.
77,771	Helen	Goderich	3	Out of existence	
116,581	Help	Liverpool	78	Stranded	Oct. 4, 1910.
103,354	Ida	Quebec	9	Broken up.	
93,297	Irene	Ottawa	2	Out of existence	
107,822	Iroquois	Victoria	94	Foundered	April 10, 1911.
85,369	Janet Craig	Ottawa	6	Out of existence	
77,992	John McDonald	Ottawa	16	Out of existence.	
100,415	Jupe	Ottawa	8	Broken up	
117,034	Kate	Sault Ste. Marie	30	Burnt	April 25, 1910.
71,224	Kate Marks	Sault Ste. Marie	43	Abandoned as worthless	
61,443	Lady Dufferin	Chatham, N.B.	29	Broken up	
85,474	Little Jem	Port Dover, Ont.	2	Out of existence	
83,076	Lizzie	Ottawa	1	Out of existence	
71,170	Lochair	Port Hope	281	Out of existence	
85,532	Marina	Yarmouth	16	Stranded	Dec., 1911.
80,001	North America	Charlottetown	99	Wrecked	Nov. 15, 1911.
107,217	Petrel	Winnipeg	94	Wrecked	May 27, 1910
103,102	Plover	Montreal	27	Broken up	
110,205	R-Tissé	Charlottetown	3	Condemned	
117,080	Wasaga	Collingwood	1,108	Burnt	Nov. 6, 1910.
34 Vessels			2,171		

SAILING VESSELS REGISTERED IN CANADA, DECEMBER, 1911.

Official No.	Name of Ship	Port of Registry.	Rig.	When and where built	Length	Breadth	Depth	Regd. tonnage	Owner or Managing Owner.
130,701	Ada D. Bishop	Shelburne	Schr..	1911 Shelburne, N.S..	97.0	22.6	9.7	93	Charles F. Bishop, Burin, Nfld.
126,228	D. P. Dobbins	Sarnia	Schr..	1863 Cleveland, O., U.S.	164.6	32.0	12.0	421	John MacArthur, Sarnia, Ont.
130,734	Falka	Lunenburg	Schr..	1911 La Have, N.S..	106.8	26.4	10.5	100	Charles Conrad, M.O., La Have, N.S.
130,654	Fish Seeker	Chatham, N.B.	Schr..	1911 Caraquet, N.B..	40.5	13.5	6.0	20	Gustave Joseph Gallien, Caraquet, N.B.
130,584	Gladys E. B.	Halifax	Schr..	1911 Tancook, N.S..	47.2	13.9	7.0	24	Walter Brown, M.O., Herring Cove, N.S.
130,735	Jennie P. S.	Lunenburg	Schr..	1911 Tancook, N.S..	59.2	14.0	7.6	34	Creighton Young, M.O., Hacketts Cove, N.S.
130,796	K. & W. No. 8	Vancouver	Barge	1907 N. Westminster, B	64.0	25.8	7.0	97	George C. McKeen, Vancouver, B.C.
130,502	Marjorie N. Inkpen	Shelburne	Schr..	1911 Shelburne, N.S..	95.0	22.9	9.8	96	Ephraim Inkpen, Burin, Nfld.
130,427	Mollie G. Gaskill	St. Andrews, N.B.	Schr..	1911 Campo Bello, NB.	52.4	16.1	6.6	23	Joseph E. Gaskill, Grand Manan, N.B.
130,733	Muriel E. Winters	Lunenburg	Schr..	1911 Lunenburg, N.S.	106.8	26.3	10.4	100	Freeman, Anderson, Lunenburg, N.S.
126,673	Number Forty Five	Port Arthur	Scow..	1911 Port Arthur, Ont.	172.0	37.2	13.0	726	The Western Dry Dock and Shipbuilding Co., Ltd., Port Arthur, Ont.
126,674	Number Forty Six	Port Arthur	Scow..	1911 Port Arthur, Ont.	172.0	37.2	13.0	726	The Western Dry Dock and Shipbuilding Co., Ltd., Port Arthur, Ont.
130,608	V. I. T. No. 1	Victoria, B.C.	Barge	1911 Victoria, B.C.	90.0	32.0	8.2	193	Vancouver Island Towing Co., Ltd., Victoria, B.C.

*Foreign name "Margaret."

for traffic bound for the Far East. The paper points out that the United States can afford to be generous in regard to canal fees, because, unlike the Suez Canal, the Panama Canal is not essentially a money-making enterprize, while the United States is so rich that it does not need to think of recuperating itself for the cost of the canal from its revenues.

CORROSION OF CONDENSER TUBES.

By Arnold Philip.

All condenser tubes, he said, through or round which sea water flowed, were corroded, but the nature of the corrosion varied very greatly. By far the greater number of such tubes were merely uniformly corroded over as much of their surface as was exposed to salt water, but a certain small number of tubes, besides the uniform corrosion of their surface on the sea-water side, also underwent a local corrosion or pitting, which caused trouble to the engineer. The author's remarks applied specially to the relatively small number of cases in which localized corrosion occurred in condenser tubes made of Admiralty composition—namely, copper 70 parts, tin 1 part, and zinc 29 parts. It was his opinion that the cause for fully 90 per cent. of the cases of corrosion observed in the establishments of the Royal Navy had long been known; the methods of overcoming or neutralizing such corrosive action had been the subject for experiment, and very effective protective devices had been employed for a long time. It was conceivable, however, that more satisfactory preventive methods might be devised in the future, and doubtless it was to this end that the investigations of the Corrosion Committee would be largely directed. The 10 per cent. of the total cases of observed corrosion was considered to be rather an excessive estimate of the number which were found to be obscure in origin. There were several reasons for this opinion, and among them was the difficulty of obtaining full and trustworthy information concerning the natural history of the occurrence. The necessarily high pressure under which engineering duties were normally carried out rendered it difficult and sometimes impossible to state fully all the observable conditions under which a particular case of corrosion had occurred, and the omission of such details, it was considered, frequently caused such an instance of corrosion to be classed as one of the 10 per cent. of obscure cases, whereas it should actually be classed amongst those of which the origin was known.

Freedom From Corrosion in the Navy.

One of the chief difficulties in studying the behavior of condenser tubes under corrosion was due to the fact that the corrosion so seldom appeared. In spite of the fact that some millions of tubes were in use in the Royal Navy at any given moment, the number of cases as coming under the notice of the author, in which localized corrosion had been observed, did not at present amount to more than about two yearly. This freedom must, it was considered, be attributed to three causes:—First, to the particular chemical composition of the metal which had been selected for the manufacture of tubes. Secondly, to the very satisfactory manner in which tube manufacturers were able to produce tubes of the exact chemical composition specified; and in this connection it might be stated that during the past ten years only one case was known to the author in which the chemical composition of a corroded tube could be considered as not satisfying the specified limits. In that particular case the 1 per cent. of tin had been omitted from the mixture. The third cause to which the freedom from corrosion of the condenser tubes used in the Navy was to be attributed was undoubtedly the consistent manner in which the use of steel, iron, or zinc protector slabs and bars had always been insisted upon. The protective action of iron and zinc in condensers in the service had been utilized in several forms. It was originally used in condensers in which the body was of cast or wrought iron, and the sea water passed outside the tubes, and was, therefore, at the same time in direct contact with the outside of the metal condenser tubes and the inside of the iron case. In these circumstances the protection was complete, and whilst corrosion of the steel or iron casing took place, the corrosion of the tubes was practically unknown.

The presence of a so-called electro-positive protective metal such as aluminum, zinc, or iron alone, however, was not sufficient to prevent the corrosion of the condenser tubes immersed in the

SAILING VESSELS REMOVED FROM THE CANADIAN REGISTER, DECEMBER, 1911.

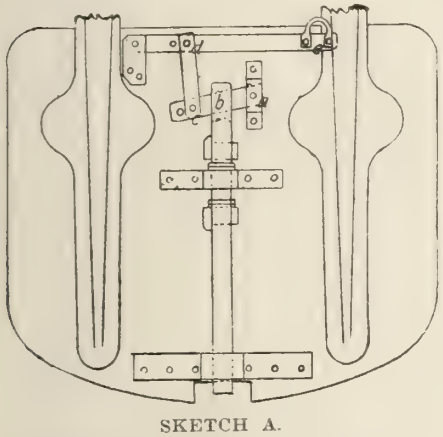
Official No.	Name of ship.	Port of registry.	Net tonnage	Cause assigned.	Date of loss
85,771	A. Gauthier ...	Ottawa	137	Out of existence.	
71,601	Colborne	Montreal	302	Broken up.	
83,238	Ethel Aggie ...	Charlottetown	48	Wrecked.	
102,063	Germainne	Montreal	87	Broken up.	
100,888	Hattie Muriel....	Saint John, N.B.	85	Wrecked	May 4, 1911.
92,458	Jubilee	Charlottetown	76	Sold to foreigners.	
112,098	Julie Plante	Lunenburg	62	Broken up.	Nov. 4, 1911.
111,631	Loyal	Lunenburg	99	Stranded	Nov. 29, 1911.
112,344	Marconi	Liverpool, N.S.	199	Abandoned at sea.	
121,998	Margaret S.	Lunenburg	63	Transferred to St. John's, Nfld.	
107,337	Marguerite	Yarmouth, N.S.	57	Broken up.	Dec. 1, 1911.
61,373	Maria	Chatham, N.B.	28	Lost	Nov. 22, 1911.
103,758	Muriel	Lunenburg	110	Stranded	
116,530	Nahada	Lunenburg	94	Transferred to St. John's, Nfld.	
116,392	Naiad	Sarnia	276	Abandoned.	
69,203	R. W. Smith	Lunenburg	74	Broken up.	
121,899	Reliance	Shelburne	192	Wrecked	
107,653	Renown	Lunenburg	79	Lost at sea	Nov. 13, 1911.
103,464	St. Patrick	Halifax	27	Wrecked	Sept. 5, 1911.
100,082	Scud	St. John, N.B.	56	Broken up.	Nov. 15, 1911.
122,084	Sweet Marie	Charlottetown	77	Wrecked.	
	21 Vessels		2,228		

STEAM VESSELS REGISTERED IN CANADA, DECEMBER, 1911.

Official No.	Name of ship	Port of Registry	When and where built	Length	Breadth	Depth	Gross tonnage	Regd. tonnage	Engine H.P.	Owner or Managing Owner.
[illegible]	Adelia	Montreal	1911 St. Gabriel de Brandon, Que	51.0	11.3	3.2	19	13	1½	St. Gabriel Lumber Co., Montreal.
[illegible]	[illegible]	[illegible]	[illegible]	125.1	48.1	12.5	595	268	23	Napier & Miller, Dalmuir, G.B.
[illegible]	M. T. Co. No. 1.	Vancouver	1911 Coal Kilpatrick, G.B.	16.5	11.6	4.4	20	14	6	Metropole Transportation Co., Vancouver.
[illegible]	Phyllis Wilson	Winnipeg	1900 Beach, Wash., U.S.A.	103.0	21.5	8.0	164	112	31	Lake Winnipeg Shipping Co., Winnipeg.
[illegible]	[illegible] Allen	[illegible]	1911 Selkirk, Man.	290.6	46.1	14.3	3099	1904	610	Can. Pac. Ry. Co., Montreal.
126,618	[illegible]	[illegible]	1911 Wallsend-on-Tyne, G.B.	30.0	8.6	4.0	9	6	½	John D. Leighton, M.O., Metlakatla, B.C.
			1911 Metlakatla, B.C.							

same bath of sea water, and it was essential that there should be a direct electrically conducting connection between the tubes and the protecting metal or metals, and that the protector metal and the condenser tubes should be both immersed in the same electrolyte. It had been shown again and again that any want of a good electrical connection rendered the protective action of the iron, steel, or zinc upon the condenser tubes quite nugatory. Where, however, the contacts of the protective metal with the tubes were satisfactory, corrosion did not occur.

A peculiarity of the small number of the cases in which corroded condenser tubes had been observed was the fact that in almost all them, the corrosion had occurred along the bottom of the inside of the tubes, and it was considered that this indicated that the trouble had been set up by the contact of particles of coke, carbon, or ferric oxide, or other conducting electro-negative solid



SKETCH A.

Door of Dipper of 95 ton Steam Shovel Showing Compound Latch Trip.
Height of Door ..... 4¾ feet
Width ..... 5½ feet

materials deposited from the cooling water upon the inside bottom surfaces of the tubes setting up local galvanic action. Such action was increased, of course, when a condenser was not in use and the tubes remained full of sea water, for the particles then had time to settle out along the bottom line and gave rise to the localized corrosion. If, on the other hand, the condenser was emptied of sea water when out of use, there would again appear to be a possible source of danger of corrosion along the bottom inside surface of the tubes, owing to the fact that this portion would be longest exposed to the joint action of salt water and air. In either method of treatment, however, it was considered that the causes of corrosion could be minimized or altogether removed if it were found to be at all feasible to employ condensers with vertical or strongly inclined tubes, and if every precaution were observed to take up the cooling water from such positions as would give the least chance of ashes from the ash-ejector being carried into the tubes.

The author then gave particulars of five cases of corrosion of condenser tubes which were all that had come under his observation during the past three years, and in only one of these was it impossible to ascribe the corrosion to the contact of particles of electro-negative solid conducting material. In this case it was considered evident that the corrosion had been due to the faulty connection between the tubes and the zinc protectors which had been acted upon very little.—T.E.S.

STEAMSHOVEL DIPPER TRIPS.

AN investigation is under way at the Panama Canal to determine the relative efficiency of the steamshovel "trips," operated by steam, known as the Geddes and Wichman "trips." These are a culmination of a development in the improvement of tripping devices that began soon after the first steamshovels were set at work in Culebra Cut.

Suitable Unlatching Device the Aim.

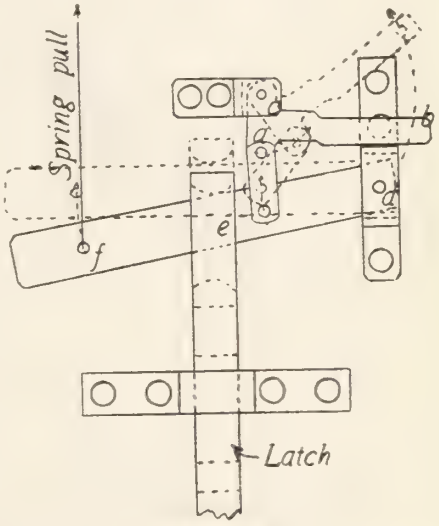
In the accompanying sketch C, the dipper of the shovel is shown in dumping position, the emptying process being accomplished by pulling a latch, by which the door of the shovel is held. When the shovel is ready to dig, the dipper is near the ground with its centre back of a vertical line through the centre of the shipper shaft, as the shaft of the big gear is called. In this position, the door of the dipper closes of its own weight and is latched firmly. When the dipper is loaded, the spoil within it bears down upon the door and tends to hold it so firmly in place that the power required to open the latch is often so great as to cause a serious strain on the craneman, who unlatches the door. Ease in opening the door is an advantage, both to the craneman and in accelerating the work of digging. The various improvements on methods of unlatching, or of "tripping" the latch, as it is called, have in view this dual advantage.

When the shovels arrived on the Isthmus they were equipped with a single lever latch operated by a 1¼-inch rope in the hand of the craneman, and attached at its other end to the "trip" of the dipper. Several pulls were often necessary to open the latch, and almost invariably a great effort was required. The string by which this "trip" was operated passed through a sheave on the dipper stick near the dipper and thence to the craneman's hand.

Unlatching Improvements Devised.

The first improvement was to compound this original "trip," and in the drawing herewith A, the compound "trip" is shown. The original was the simple lever with the fulcrum at (a), the weight at (b) and the power at (c). In the compound "trip," another fulcrum was made at (d) and the power was applied at (e), where the line was attached. By this device a movement of 20 inches in the line resulted in a 1-inch movement of the latch.

Among improvements upon the compound device, one that was given a trial in 1909 was the "spring trip" which consisted of the lever, shown in the second illustration herewith, B, and a bar passing through a slot in the latch, with a spring attached at its out-



SKETCH B.

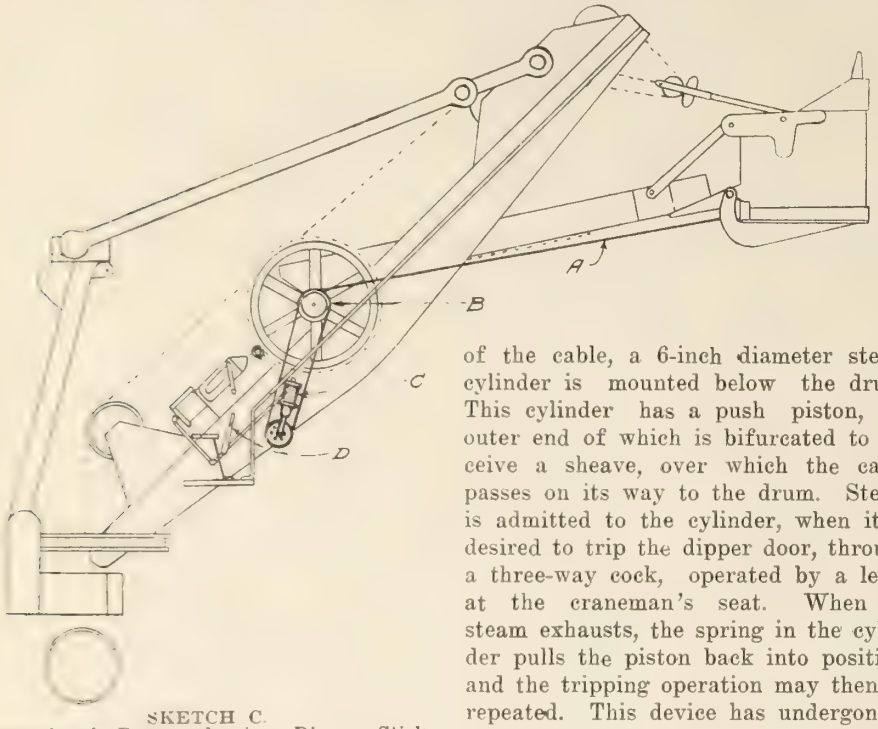
Portion of steamshovel dipper door showing arrangement of spring latch.
(a) Toggle joint. (b) Power to break joint (c Fulcrum of toggle lever. (d) Fulcrum of spring lever. (e) Weight of latch. (f) Power of spring.

er end; the power for unlatching being supplied by the spring. The rope by which the "trip" is operated is attached at (b), the fulcrums are at (c) and (d), at (a) is a toggle joint, at (e) the weight and at (f) the power applied by the spring. The door is closed by its own weight, when in digging position, placing a tension of 1,300 pounds upon the spring, and drawing the toggle joint erect. When the dipper is in the dumping position, the craneman pulls the rope, thereby breaking the toggle joint and allowing the spring to exert its pull upon the latch, which flies back, permitting the dipper to empty. The spring required was of ½-inch wire, 31 coils, 2¼ inches outside diameter, and 21 inches long when free. This device worked satisfactorily, but the toggle joint required constant renewing, and some difficulty was experienced in obtaining suitable springs, so

that the appliance was finally abandoned.

Steam Power Trip.

The first steam power trip was a device placed upon his shovel by Thomas Custy, a steamshovel engineer, in 1908, but after a few month's trial this was discarded. This device was improved upon by A. H. Geddes, also a steamshovel engineer, until it became practicable, and a patent has been granted to him. In this device, a steam cylinder is located on the dipper stick near the dipper, the piston is connected with the dipper latch through a chain and a series of levers, and when steam is admitted to the cylinder, the thrust of the piston operates the levers and unlatches the door. Steam is admitted and exhausted from the cylinder through a three-way valve located on the boom beside the craneman's seat. A steam pipe extends from the valve along the boom opposite the dipper stick slot, and at the end of this pipe and on the cylinder, are universal joints which are connected with one another by a flexible hose. After a thorough trial this device was adopted, upon the recommendation of a committee of two mechanical experts and a steamshovel engineer, who reported that the capacity of a shovel was increased 100 cubic yards a day by its use.



SKETCH C.
Steamshovel Boom, showing Dipper Stick, Dipper, and Operating Gear, with Wichman Tripping Device.
A—½-inch Wire Rope. B—Winding Drum. C—Steam Cylinders. D.—Operating Lever.

A Further Improvement.

The latest device, that shown in the illustration, was invented by F. S. Wichman of the Mechanical Division. The latch is opened by a pull made on a ½-inch wire rope by the outward thrust of the piston of an air brake cylinder. The mechanism is fixed upon the boom of the shovel. A drum is mounted upon the face of the thrusting gear, or shipper shaft, which revolves with the shaft, thus winding or unwinding the tripper rope, according as the dipper shaft moves up or down. In this way the rope is kept taut at all times. To give the lengthwise pull of the cable, a 6-inch diameter steam cylinder is mounted below the drum. This cylinder has a push piston, the outer end of which is bifurcated to receive a sheave, over which the cable passes on its way to the drum. Steam is admitted to the cylinder, when it is desired to trip the dipper door, through a three-way cock, operated by a lever at the craneman's seat. When the steam exhausts, the spring in the cylinder pulls the piston back into position, and the tripping operation may then be repeated. This device has undergone a successful test on two 95-ton steamshovels.—Canal Record.

Notices to Mariners

THE Department of Marine and Fisheries, Ottawa, earnestly request pilots, masters and others interested, to send information of dangers, changes in aids to navigation, notice of new shoals or channels, errors in publications, or other facts affecting navigation in Canadian waters, to the chief engineer, Department of Marine and Fisheries, Ottawa, Canada. Such communications can be mailed free of Canadian postage.

No. 125—December 16—Nova Scotia.

347.—The black can buoy moored off Grampus rock, south coast of Nova Scotia, will, without further notice, be replaced by a bell buoy, moored in the same position. The buoy is painted black, with "Grampus" in white letters on the deck, and is surmounted by a bell rung by the motion of the buoy on the waves.

348.—A light established by the Government of Canada on the top of the cliff immediately above the small cove, locally known as Friar head boat harbor, situate 2¼ miles southward of Friar head, west coast of Cape Breton island, will be put in operation on the opening of navigation in 1912. The light is a fixed white light, shown from an anchor lens lantern hoisted on a white pole 14 feet high, which stands on a ridge about 70 feet high. There is a shed painted red at the base of the pole. The light is elevated 84 feet above high water mark, and should be visible 7 miles from all points of approach by water.

349.—On the opening of navigation in the spring of 1912, the illuminating apparatus in the front range lighthouse at Margaree, in the county of Inverness, on the west shore of Cape Breton, will be changed without further notice from catoptric to dioptric of the sixth order, and the arc of visibility will be increased so that the light will show as soon as it opens clear of Grey point, and in all other directions from seaward. The characteristic of the light will remain as heretofore fixed red.

No. 125—December 16—Quebec.

350.—The light shown from Pointe a Basile back range lighthouse, river St. Lawrence, has been improved by the substitution of a fourth order dioptric illuminating apparatus for the catoptric apparatus heretofore used; and the arc of visibility has been increased so that the light now shows in the channel to upward bound vessels from the time that it is about abeam.

No. 126—December 22—British Columbia.

351.—Ballenas islands lighthouse, Strait of Georgia, is being moved from the southerly Ballenas Island to the northerly Ballenas Island; and the light will be shown from the lighthouse in its new position on or after the 1st January, 1912, when the maintenance of a light on the southerly island will be discontinued. The lighthouse will stand on the summit of the north Ballenas Island, 1240 feet S. 42 degrees E. from the fog alarm building on the north point of the same island, and 5126 feet N. 50 degrees W. from the old site of the lighthouse on the south island. The lighthouse tower is an enclosed wooden building, square in plan, with sloping sides, painted white, surmounted by a square wooden lantern, painted red. The height of the tower from its base to the top of the ventilator on the lantern is 33 feet. The fixed white light will be elevated 280 feet above high water mark, and should be visible 14 miles from all points of approach. The illuminating apparatus is temporarily dioptric of the seventh order.

352.—The Geographic Board of Canada have decided to adopt the name

"Koya Point" for the first prominent point on Moresby Island to the eastward of Langford Point, on the north side of the eastern entrance to Houston Stewart Channel The light station on the point (referred to in Notice to Mariners No. 97 (261) of 1911), will therefore be called "Koya" light station.

No. 127—December 22—Ontario.

353.—The light and hand fog horn heretofore maintained on Bamford Island, St. Joseph Channel, have been permanently discontinued.

354.—A new lighthouse tower has been erected at Caribou Island light station, Lake Superior, from which the light will be put in operation on the opening of navigation in 1912, when the exhibition of a light from the old lighthouse will be discontinued. The new tower stands immediately west of the site of the old lighthouse. It is a hexagonal reinforced concrete structure, stiffened by 6 flying buttresses and surmounted by a red circular metal lantern. The height of the tower from its base to the vane on the lantern is 104 feet. The light will be a flashing white light, showing three bright flashes every 10 seconds. The light will be elevated 99 feet above the level of the lake, and should be visible 15 miles from all points of approach by water. The illuminating apparatus is dioptric of the second order, and the illuminant petroleum vapor, burned under an incandescent mantle. The lantern will ultimately be removed from the old tower and the tower cut down and roofed for use as a portion of the keeper's dwelling.

No. 128—December 29—Quebec.

355.—Alright Reef bell buoy is moored 4 1-3 miles S. 68 degrees E. from Cape Alright, Magdalen Islands, and not 4½ miles S. 83 degrees E. from Cape Alright, as stated in the List of Lights.

356.—A chart, in colors, of the South Traverse, river St. Lawrence below Quebec, numbered 205 of the Canadian Hydrographic Survey has just been published by the Hydrographic Surveys Branch of the Department of the Naval Service of Canada. Copies may be obtained from the Hydrographic Survey Office, Department of the Naval Service, Ottawa, and from the Agents of the Department of Marine and Fisheries at Quebec and Montreal, for fifteen cents per copy, payable in advance.

No. 128—December 29—Newfoundland.

357.—Two hoisting frames, painted red, have been erected at Musgrave Harbor, from each of which a fixed red lantern light is shown for the guidance of fishing boats. The front one is on the Government wharf, the rear one on Musgrave Harbor ridge, 400 yards distant.

358.—Two fixed white range lights have been established in the settlement of Melrose (Ragged harbor), east coast of Newfoundland, for the guidance of fishing boats. These lights are shown from hoisting frames, painted white.

359.—A lighthouse tower has been erected on the south side of Davis Island, Flat Islands, Placentia Bay, south coast of Newfoundland, and the light will be put in operation in January, 1912. The tower is a wooden building, square in plan, with sloping sides, painted red and white in horizontal bands. The height from the base of the tower to the focal plane is 25 feet. The light is an occulting white light, visible 2½ seconds and eclipsed 2½ seconds alternately. It is elevated 67 feet above high water mark. The illuminating apparatus is dioptric of the sixth order.

360.—A lighthouse has been established on the eastern pier of the harbor of Fortune, Fortune Bay, south coast of Newfoundland. The lighthouse tower is a square wooden building, painted white. The light is an occulting white light, visible 2½ seconds and eclipsed 2½ seconds alternately. It is elevated 20 feet above high water mark. The illuminating apparatus is dioptric of the sixth order.

No. 129—December 30—Nova Scotia.

361.—On or about 1st March, 1912, the gas and whistling buoy moored off Southwest ledge, off Cape Sable, southwest coast of Nova Scotia, will, without further notice, be moved one mile S. 57 degrees W. from its present position. In its new position it will be distant 4 miles S. 57 degrees W. from Cape Sable lighthouse.

362.—A bell buoy will, without further notice, be established in 24 fathoms ¾ mile S. 45 degrees E. from the south extreme of the southeasterly portion of Bassoon Reefs, south coast of Nova Scotia. The buoy is painted black, with "Bassoon Reefs" in white letters on the deck, and is surmounted by a bell rung by the motion of the buoy on the waves.

363.—A new lighthouse tower has been erected on the northeastern point of Kidston Island, entrance to Baddeck Harbor, St. Patrick Channel, Cape Breton Island, near the site of the old lighthouse, and the light will be put in operation on the opening of navigation in 1912, when the exhibition of a light from the old tower will be discontinued and the old tower taken down. The new tower is an enclosed wooden building, square in plan, with sloping sides, painted white, surmounted by an octagonal iron lantern, painted red. The height of the tower from its base to the top of the ventilator on the lantern is 50 feet. The light is a fixed red light elevated 48 feet above high water mark, and should be visible 6 miles from all points of approach by water. The illuminating apparatus is dioptric of the fourth order.

364.—A lighthouse, established by the Government of Canada on the extremity of Owls head, Owls Head Bay, south coast of Nova Scotia, will be put in operation, without further notice, on 15th February, 1912. The lighthouse, which stands on ground 56 feet above high water mark, consists of a square wooden dwelling, painted white, with a red octagonal iron lantern rising from the middle of its hip roof. The height of the building from its base to the top of the ventilator on the lantern is 38 feet. The light is an occulting white light, visible 10 seconds and eclipsed 5 seconds alternately. It is elevated 88 feet above high water mark, and should be visible 15 miles from all points of approach by water. The illuminating apparatus is dioptric of the fourth order.

No. 1—January 1, 1912—General.

1.—Notice is hereby given that, on and after the first of January, 1912, true or astronomic bearings will be given in all notices to mariners issued by this Department. The bearings will be given in degrees, true or astronomic, reading from 0 degrees at north to 360 degrees, measured clockwise. These bearings may be followed by magnetic bearings in degrees, in brackets. Where applicable all bearings will be given from seaward In the forthcoming edition of the Canadian List of Lights and Fog Signals, corrected to 1st April, 1912, true bearings only will be given, numbered from 0 degrees at north measured clockwise to 360 degrees.

No. 2—January 10—Nova Scotia.

2.—Bay of Fundy—Entrance to Digby Gut—Point Prim light station—New fog alarm building—Change in fog alarm.

Position.—New fog alarm building stands on the west side of and close to the old fog alarm building.

Date of replacement—1st February, 1912.

Alteration—Steam fog whistle will be replaced without further notice by a diaphone, operated with air, compressed by an oil engine. It will give one blast of 4 seconds' duration every half minute.

Voyage of the Corozal.—The ladder dredge Corozal, which left Falmouth for Panama via the Strait of Magellan on December 1, but had to turn back because of heavy seas, having stove-in five frames at the forecastle above the waterline, has been repaired and made a second start on December 29.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals who Have Been More or Less Prominent in the Marine Sphere

Henry L. Beauvais, master of the [illegible] was wrecked on the lakes last fall, resulting in the death [illegible] of the crew, has been exonerated from all blame by Inspectors Capt. F. L. R. Pope and Wm. P. Nolan, of Buffalo.

Mr. F. D. Swan, the English engineer who was engaged by the Dominion Government to prepare a plan for harbor improvements at Vancouver, B.C., has practically concluded the preliminary work, and is leaving for Europe. He expects to return to Canada in March, when his report will be ready for presentation to the Federal authorities.

Captain Chas. W. Seeley, who died at Halifax, N.S., on January 29, was one of the best known mariners of that port, having seen service with the Pickford & Black line for many years. The deceased officer was in the 64th year of his age.

Captain Robert W. Walton, Port Dalhousie, a well-known mariner, died recently in the hospital at St. Catharines, Ont., after forty-eight hours' illness.

Captain James W. Green, one of the best known lake captains, died at his home in Port Huron, recently. He was 83 years of age.

J. R. Taylor, of Prescott, has been appointed a marine light commissioner for the river St. Lawrence by the Dominion Government.

Mr. Walter Hawkes, representative of the Garlock Packing Co. Hamilton, in Eastern Canada, attended the Grand Council meetings of the N.A.M.E., held in Ottawa recently, and if appearances are any criterion, his presence is always welcome and his popularity on the increase among the brethren.

Thos. J. S. Milne, past grand president, N.A.M.E., is to be made the recipient of a testimonial as a mark of appreciation of his services during a seven years occupancy of the Grand Council chair. A committee has been appointed to make the presentation.

PROPOSED CANADIAN "LLOYDS."

A move is being made towards a Canadian marine Lloyds, in agreement with the promise of Government aid made by Hon. Mr. Pelletier at the Builders' Exchange banquet, Montreal. It is proposed to form a mutual company, the Government guaranteeing it up to a million dollars. At the outset the company would charge the same rates as fixed by Lloyds, and at the end of the year, after paying four per cent. on the Government loan and a ten per cent. sinking fund, would give back to the subscribers what remained. The management would consist of three men appointed by the Government, one an expert underwriter and one a shipping man. At the end of five years the experimental stage would be passed, and rates could be regulated.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.

President— F. Plummer, Toronto; **Counsel**—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.

Chairman—E. E. Horsey, Kingston, Ont.
Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.

President—W. M. Lowrie, New York.
Secretary—M. R. Nelson, New York. .. ....

THE SHIPPING FEDERATION OF CANADA

President—A. A. Allan, Montreal; **Manager and Secretary**—T. Robb, 526 Board of Trade, Montreal.

SHIP MASTERS' ASSOCIATION OF CANADA.

Grand Master—Capt. J. H. McMaugh, Toronto, Ont.; **Grand Secretary-Treasurer**—Capt. H. O. Jackson, 376 Huron St., Toronto.

GRAND COUNCIL, N.A.M.E. GRAND OFFICERS.

James T. McKee, 268 Douglas Avenue, St. John, N.B., Grand President.
Thos. Theriault, Levis, P.Q., Grand Vice-President.
Neil J. Morrison, P.O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
Jno. A. Murphy, Midland, Ont., Grand Conductor.
George Bourret, Sorel, P.Q., Grand Doorkeeper.
Richard McLaren, Owen Sound, Ont.
L. B. Cronk, Windsor, Ont.
Grand Auditors.

CANADIAN BOARD OF STEAMBOAT INSPECTORS.

The annual conference of the Canadian Board of Steamboat Inspectors was held in Ottawa on January 30, 31 and February 1st. E. Adams, Ottawa, chairman of the board, presided, and the following representatives were present at the various sessions: J. Dodds, Toronto; E. W. McKean, Collingwood; T. P. Thompson, Kingston; F. X. Hamelin, Sorel; N. A. Currie, Halifax; C. E. Dalton, St. John; J. H. Fontaine, Quebec, and J. A. Thomson, Victoria, B.C. Morning and afternoon meetings were held each day, at one of which a deputation from Montreal, representing the large shipping interests, craved the board's consideration of a proposal to make unnecessary the inspection and test of a vessel's boilers, already and just previously granted a Lloyd's or British Corporation certificate. It was claimed that on account of the double inspection, not only was delay and inconvenience caused, but uncalled for, straining of the boiler structure resulted in addition.

TORONTO COUNCIL NO. 1, N.A.M.E.

At the annual meeting of Toronto Council No. 1, National Association Marine Engineers of Canada, held on January 3, the following officers were elected for the ensuing year: Hon. Pres., O. P. St. John; Pres., A. J. Fisher; 1st vice-president, Charles Arnot; 2nd vice-president, W. C. Wood; Secy., E. A. Prince; Asst. Secy., H. G. Hawkins; Treas., W. L. Griffin; Conductor, James Bonner; Doorkeeper, J. E. Thompson; auditors, J. C. Urquhart and B. Henry; delegate to Grand Council, J. W. Aston; alternative delegate, H. Parkes; finance committee, Thos. Good, Bernard Henry and J. C. Urquhart.

SUB-COUNCIL OFFICERS.

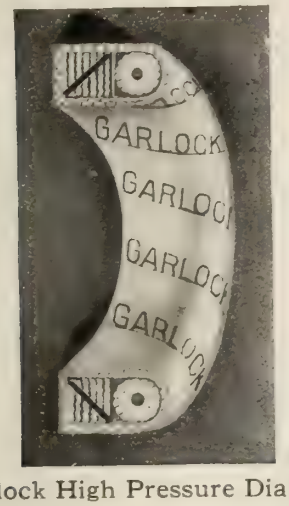
Name	No.	President.	Address.	Secretary.	Address.
[illegible]	1	J. W. Aston	93 Cowan Ave.	E. A. Prince	61 Elm Grove Ave., Toronto.
[illegible]	2	Jas. T. McKee	268 Douglas Ave.	G. T. G. Blewett	65 Harrison St., St. John, N.B.
[illegible]	3	Jas. McRoberts	Collingwood	Robert McQuade	Collingwood, Ont.
[illegible]	4	George Flemming	3 Brewery Lane	James Gillie	97 Clergy St., Kingston, Ont.
[illegible]	5	A. F. Hamelin	3208 Le Tang Street	Dominique Leclaire	Lachine Locks, Montreal, P.Q.
[illegible]	6	Alex McNavern	Five Sisters Block	Peter Gordon	808 Blanchard St., Victoria, B.C.
[illegible]	7	A. S. DeGruchy	2200 Granville St.	E. Read	Victoria Court, Vancouver, B.C.
[illegible]	8	Michael Latulippe	Lauzon	Jules Lecours	Bienville, Levis, P.Q.
[illegible]	9	Wm. Steadworthy	Sorel	Al. Charbonneau	Sorel, P.Q.
[illegible]	10	Russel R. Foote	Box 657	E. J. Riley	1030 1st Ave., Owen Sound, Ont.
[illegible]	11	Alex McDonald	28 Crawford Ave.	Neil Maitland	221 London St. W., Windsor, Ont.
[illegible]	12	Arthur Abby	Midland	Jno. A. Murphy	Midland, Ont.
[illegible]	13	D. J. Murray	Victoria Rd., Dartmouth	Chas. E. Pearce	Dartmouth, Halifax Co., N.S.
[illegible]	14	Thos. O'Reilly	Sault Ste. Marie	Geo. S. Biggar	Sault Ste. Marie, Ont.
[illegible]	15	Chas. Cumming	Charlottetown, P.E.I.	Lem Winchester	32 Fitzgerald St., Charlottet'n, P.E.I.

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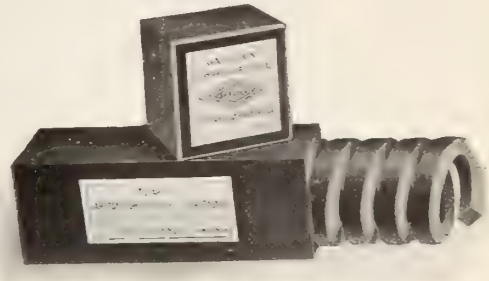
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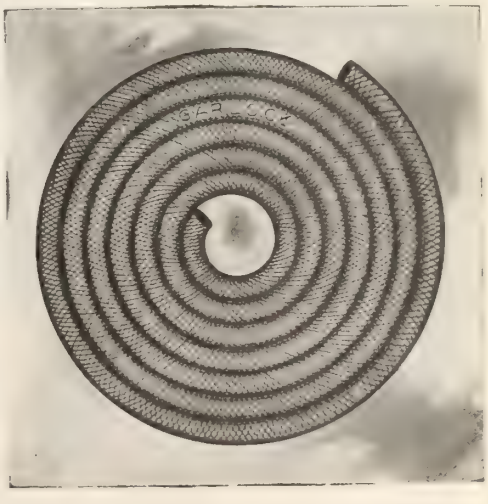
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ARC LIGHTS ON A LIGHTSHIP.

As a result of a series of tests, extending over a year, made by the United States Lighthouse Department, the Ambrose Channel lightship, marking the eastern end of the new channel into New York Harbor, has been equipped with flame arc lamps. The power equipment consists of two 7½ kw. marine type steam generator sets built by the General Electric Co., Schenectady, together with panel boards and all the necessary switches for controlling the circuits on the ship.

There are two signal masts, each carrying three lanterns of standard lighthouse design hung in gimbals in order that the plane of illumination may be maintained horizontal, regardless of the motion of the vessel. A vertical type carbon flame arc lamp, working at 110 volts, 6½ amperes, and giving a maximum horizontal candlepower of approximately 4,000, is placed in each lantern. The arc is placed at the focus of the lens, which is so arranged that the light emitted from the arc through a space of 60-deg. is concentrated and passes from the lens with a divergence of about 8 deg., the result being that a powerful zone of light is projected horizontally. The three lenses are spaced at equal distances about the masts, and at least two of them are visible from any point of view. At a distance of approximately two miles the two lights apparently merge into one light source.

A complete equipment is maintained for eight lamps, although only three are lighted at one time. The three lanterns may be simultaneously lowered by a windlass to the deck of the vessel, and into a deckhouse, where they are inspected, cleaned, adjusted, and fitted with new carbons at least once a day. In their normal position, the lamps are 55 feet. above the water-line and are visible for a radius of 8½ miles at sea level, 15 miles at an altitude of 15 feet, and 23 miles at 50 feet above sea-level. A motor placed in the engine-room controls the flashing device, giving alternately a 12 sec. flash and a 3 sec. release, this being the distinguishing and characteristic flash of the lightship. The lights are picked up by incoming vessels soon after passing Fire Island.

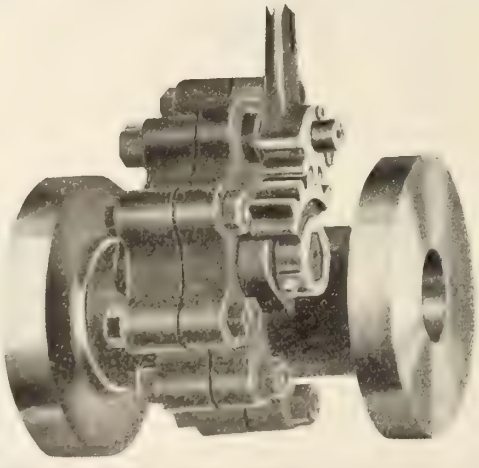
Incandescent lamps have been used for this work for a long time, but on account of the size of their filaments it was found difficult to place the light at the exact focal point. A further advantage of the flame arc lamp is found in the character of the light it emits, as experiments have shown that the yellow and white light of an arc has greater penetrating power through fog and steam and can be seen for a greater distance than the light of a tungsten filament.

Prince Rupert, B.C.—Capt. S. A. Tallander and his son, Rector, were drowned by the sinking of the tug Glen Rosa. The vessel was moored to the wharf and they were asleep on the boat, when at 2 a.m. the mooring tightened by the tide and the tug sank immediately. The accident was seen by Ed. Norman, a herring fisherman, but there was not time to save the Tallanders.

The American Ship Windlass Co., builders of the Taylor stoker, and marine equipment such as steering gears, ship windlasses, towing machines, winches, anchors, etc., have been located for over half a century in Providence, R.I., at Waterman and E. River Streets. This plant is now being abandoned and all the business of the American Ship Windlass Co. is being removed to Philadelphia where the company already had a large plant. To accommodate the growing business, a large foundry has recently been erected in Philadelphia. This company was established fifty-four years ago by Frank S. and Joseph Manton, who had much to do with the development of the ship windlass. From the manufacture of the ship windlass the company branched out, and since have added other marine machinery, and in 1905 began the manufacture of the automatic stoker, invented by E. E. Taylor, of Boston.

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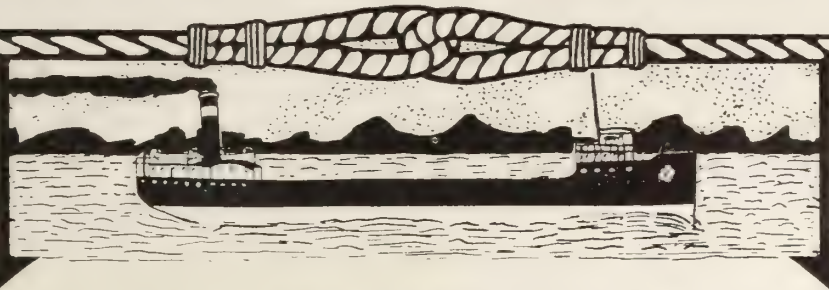


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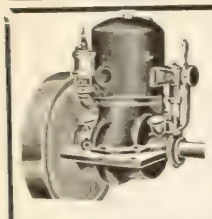
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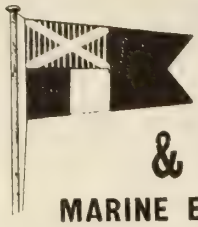
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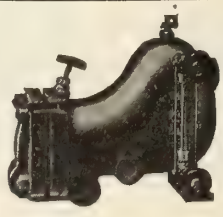
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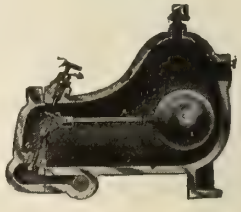
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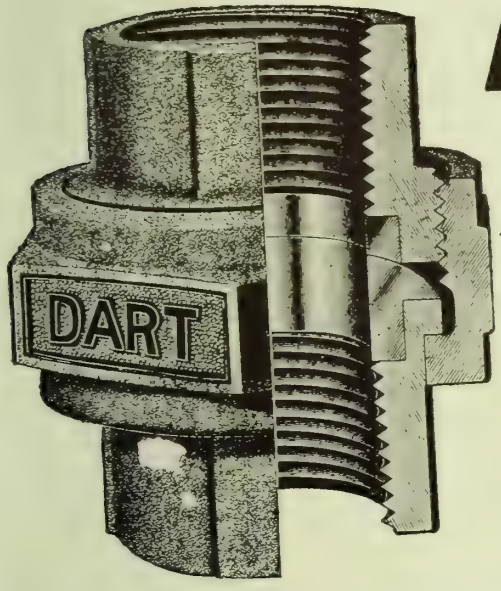
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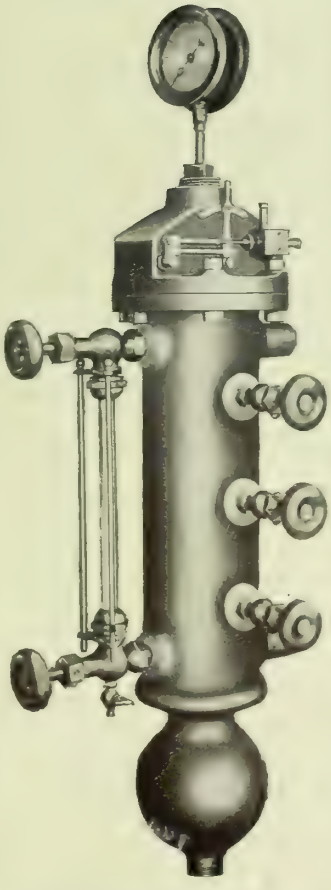
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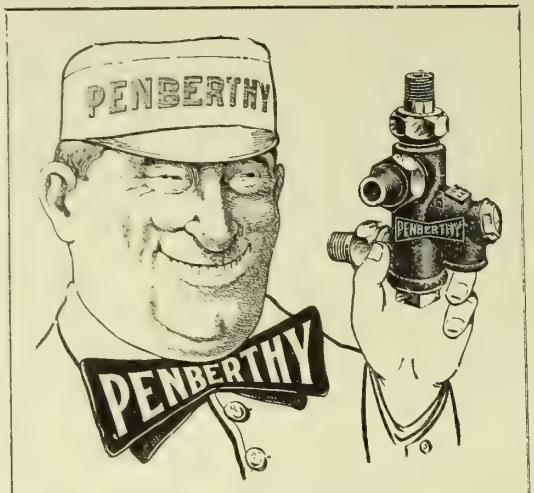
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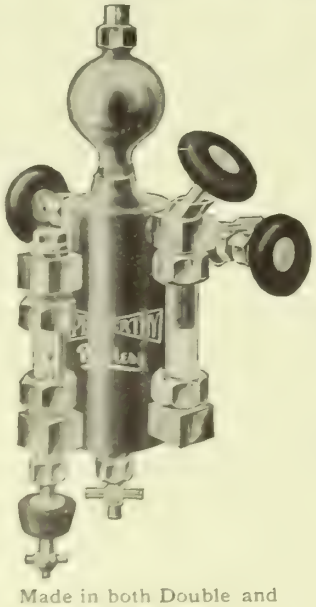
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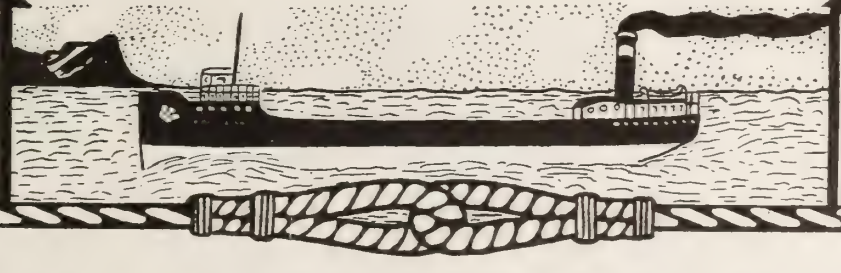
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Achievements of the Vickers Co.

Firstly, as regards the growth of the company, there is the fact that it now has a capital of 41 million dollars, employs in its English factories 25,000 operatives and pays annually about 8 million dollars in wages.

Secondly, as to their originating genius, proof is found in the great improvements in warship design, in engineering practice, in gun construction alike for land and sea forces; in the machinery for elevating, training and sighting guns, whereby power, rapidity and accuracy of fire are ensured; in the resisting capability of armor, in the securing of high economy in electrical machinery, in motor vehicles of all kinds and in railway appliances. A volume indeed might be written on the subject of the advances thus successfully applied in the manufactures of the company for peace and war.

Thirdly, as to experience, there is one convincing fact that in twelve years they have built 104 warships of an aggregate displacement of 260,000 tons and have provided propelling machinery for these and other warships of a total of over 700,000 horse power. They have manufactured guns of all calibres up to 14 in., also weapon and gun mountings for between 50 and 60 battleships or battle cruisers.

Fourthly, as to administrative ability, there is the evidence of the Secretary of the United States Navy, who, on a recent visit of inspection to many works, "found at Messrs. Vickers' plant at Barrow-in-Furness, the most efficient and up to date management, with a system of detail carried apparently as far as it could be, advantageously." By authority of Congress he sent two naval officers to Barrow-in-Furness to study the system thoroughly with a view to its adoption in United States Navy Yards, and these officers have since been appointed, as a consequence of this visit, Assistant Directors of United States Navy Yards.

The works at Barrow-in-Furness cover 100 acres and employ 12,000 skilled workmen on the construction of all types of ships, together with their propelling and ordnance machinery. At the present time there are in progress the largest super-Dreadnought yet laid down for the British Navy, the battle-cruiser "Princess Royal," a battle cruiser for Japan, a Scout, torpedo boat destroyer, submarines and the floating ship dock for the Canadian Yard, besides other work; while the propelling machinery (turbines, oil engines, etc.) in course of construction, aggregates nearly 300,000 horse power. There also have been designed and built large merchantmen, the fastest turbine channel steamer afloat, leviathan dredgers, car ferries, ice-breaking steamers like the "Earl Grey" and every type of maritime craft including floating cranes like that for the Harbor Board of Montreal.

Manufacturing Equipment.

The machinery for training and elevating the big naval and coast defence guns are also made at Barrow. The units of this machinery, which require for their manufacture immense shops and extremely accurate mechanical tools, are assembled and erected in great deep pits, so that the complete mounting is built and tried as it is ultimately to work the ship. The turntable carries the guns



— Shipbuilding and Engineering Works, Barrow-in-Furness, England.

with their supports, and all the machinery for working them and this turntable, with the armored shield enclosing all, rotates on rollers on a circular path supported within the barbette. Suspended from the turntable is the working chamber and the separate hoists for raising the projectiles and explosive charges for each gun. The whole rotates with the gun and all operations can proceed independently of the aiming of the gun. It is in the perfecting of all these marvellous and minute details that Vickers have given full evidence of scientific originality.

The forgings, armor plate and the naval, coast defence and field guns are made at the Company's works at Sheffield. These also cover an area of 100 acres and employ nearly 10,000 men. Ingots up to 70 tons are cast for the heavier work and the equipment of the various departments is the result of cumulative experience which is almost unique. Provision is made for constructing 350 guns per annum, ranging from the 14 in. gun downwards.

The quick-firing guns from 7.5 in. downwards, as well as the field guns, from the famous Vickers light mitrailleuse upwards, are made at the Erith Works of the Company. In addition, the Vickers Company have projectile making works, powder factories, and, among others, an establishment for producing every conceivable form of ordnance accessory.

These brief notes of the work and resources of the company give confidence in entertaining the view that such contracts as are entrusted to the firm for the strengthening of Canada's defensive works, mobile and stationary, and for the advancing of the Dominion's maritime and transport resources, whether for execution in Canada or in the mother country, will be carried out in the same manner as justified the First Lord of the Admiralty to say that when "Vickers deliver armaments to us (the British Admiralty) they are rendering a national service and are giving of the best that England has to give in the way of material for the service of our national fleet."

PANAMA CANAL TOLLS.

The bill for the government of the Panama canal zone and the operation of the canal was agreed to on March 9, by the House Committee on Interstate Commerce. It would give to the President, authority to fix tolls within certain limitations, a maximum of $1.25 a ton being prescribed, with a minimum not below an amount sufficient to maintain and operate the canal. No preference would be given to American ships. The vote against free American ships being 14 to 4.

As reported, the measure only admits American war vessels and ships owned by the Government to free passage. As a special concession, ships of the Panama Republic have the same privilege. The measure gives the President power to change toll rates at will, within the $1.25 per ton maximum, and the executive has absolute power to open and operate the big ditch.

Special prohibition against shipping trusts is contained in the provisions, that it shall be unlawful for any ship "owned, leased, operated, or controlled by any railroad company or any other corporation in which such railroad companies have any interest, or by any persons, associations, or corporations with intent to restrain competition," to enter the canal. The penalty for evasion of this law is fixed at $5,000 and two years' imprisonment.

The present Isthmian Canal Commission is abolished by the bill, and instead, a complete Governmental system is established. All officials are to be appointed by the President.

A simple muffler for a gas engine may be made by leading the exhaust pipe into the bottom of a barrel, filling the the barrel with scrap tin, and putting in the head, through which a hole is cut for the outlet pipe. The tin breaks up the sound waves, and muffles the noise.

LAUNCH OF THE TUG "G. R. GEARY."

THERE was launched on Thursday afternoon, March 7, from the yard of the Polson Ironworks, Ltd., Toronto, the new steam screw tug G. R. Geary, built to the order of the Department of Public Works of the City of Toronto. Mrs. Geary, mother of the Mayor, whose initials and surname give distinction to and awaken widespread and keen inter-



Vickers Limited. — Montreal Ship Dock Progress, January 20, 1912.

est in the future welfare of this new inhabitant of the Queen City bay, performed gracefully and surely the christening ceremony which committed the little vessel to its native element. At the close of the ceremony, Mrs. Geary was presented with a bouquet of red roses.

Besides the Mayor's mother, who was escorted to the christening platform by Mr. Harry Miller, of the Polson Co., there were present Mrs. Rust, Miss Rust, Mrs. J. Ardagh, Mrs. W. E. Redway, Mrs. H. Redway, Mrs. Richardson, Mrs. R. Jeffries and Mrs. Masson. The city was represented by the Mayor, City Engineer Rust, and Aldermen McBride, Wanless, and Spence.

The plans and specifications for the tug were furnished by W. E. Redway, naval architect, Toronto, under whose supervision she is being built to instructions from C. H. Rust, city engineer.

Hull and Machinery Details.

The hull, formed of Siemens-Martin open-hearth mild steel, is of exceptionally strong construction, being designed and arranged so that, when circumstances demand, the vessel may perform ice-breaking duties. The principal dimensions are as follows: Length over all, 70 feet; length b.p., 66 ft. 6 in.; beam, molded, 17 ft.; depth at side, 9 ft.; mean draft, 6 ft. 6 in.

The boiler, of Scotch cylindrical type, 10 ft. diameter, by 10 ft. long, is built to Canadian Government regulations for a working steam pressure of 150 pounds per square inch. There are 152 3-inch tubes, each 7 ft. 6 in. long, which, together with the furnace and firebox or combustion chambers, give a total of 1,087 sq. ft. of heating surface. The fire grate area is 37 sq. ft.

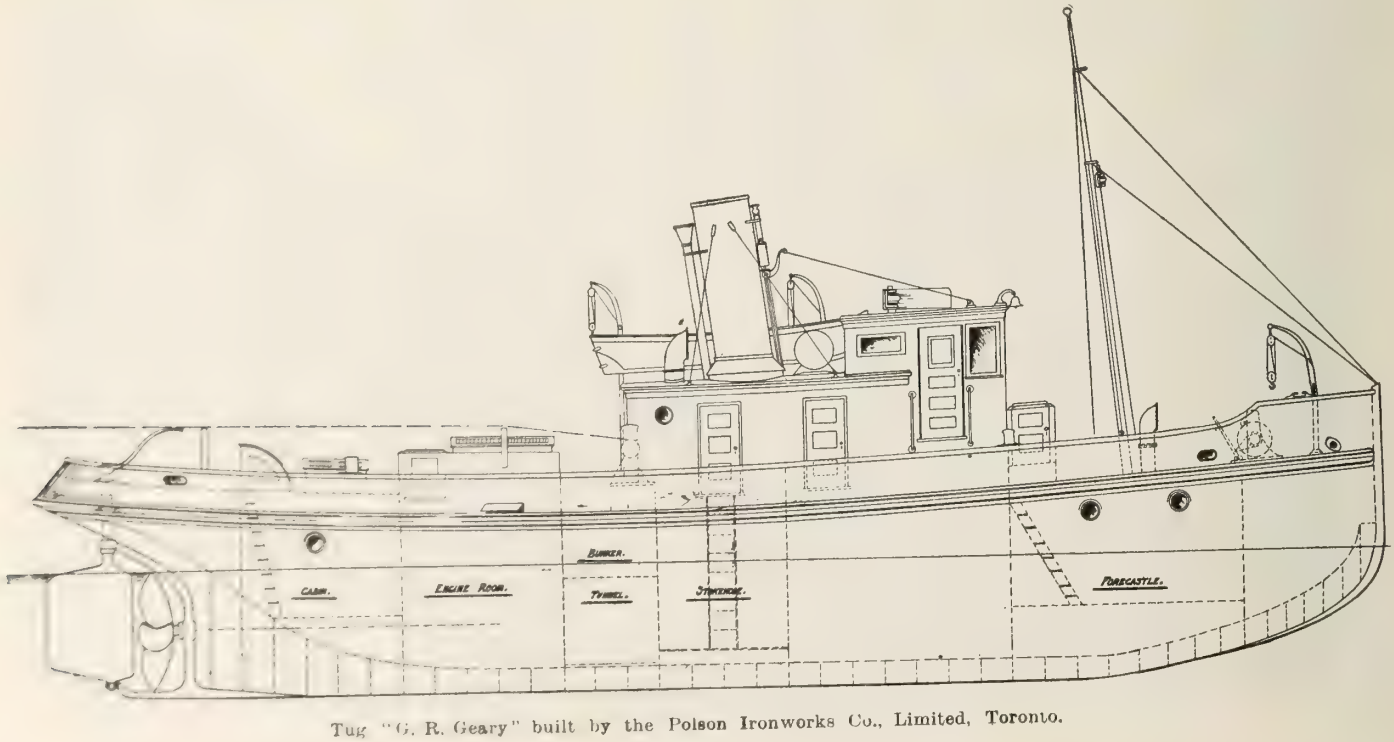
The engine, of the single cylinder vertical inverted non-condensing type, is of strong and substantial construction. The cylinder is 16 inches diameter by 18 inches stroke, and an ordinary slide valve with link motion reversing gear is fitted. The main boiler feed pump is driven by an eccentric from the crank shaft, while a Penberthy injector provides the necessary boiler feed stand-by. A horizontal duplex pump, 5½x3½x6 inches size, is installed and piped to draw from sea or bilge and discharge to boiler, on deck or overboard. The crank is balanced and a horseshoe thrust bearing with three collars is formed on the engine bed-plate. The propeller of cast steel 6 ft. diameter, is of the solid 4-blade type. A speed of 11 miles per hour is expected to be attained, and towards the end of March the G. R. Geary will be in commission.

William Newman, manager for the Polson Ironworks, had charge of the launching arrangements, and the smoothness and success attending the ceremony and his efforts, were favorably commented upon by the many citizens and marine men present. Captain James McSherry will have charge of the tug.

CENTRAL WINCH ON DREDGE "NEW ORLEANS."

ONE of the most interesting features of the U. S. Government dredge New Orleans is the arrangement of the suction pipe and cutter head and the manner in which they are operated, together with the method and machine by which they are kept under constant control and regulating for dredging.

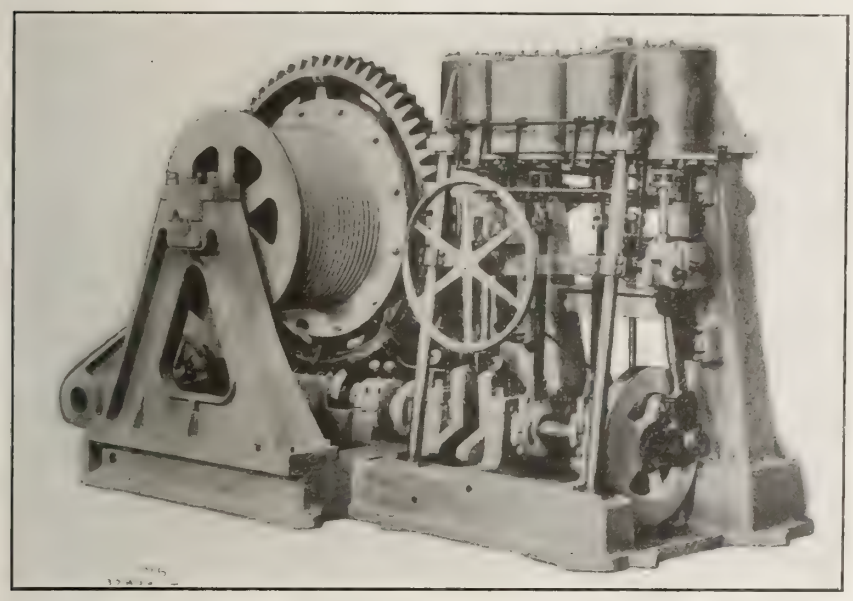
The suction pipe, 20 inches inside diameter, is hinged near the stern of the ship by hollow trunnions with the suction head at the after end. The pipe is lowered through a well in the centre of the stern, and the suction head operates like a scraper bucket by being dragged over the bottom as the ship moves forward. The suction head is like a huge enclosed rake with sharp cutting teeth through which water is forced at a high pressure to aid in breaking up the dredged material so that it will pass freely through the suction pipe. The head is 18 feet wide athwartship and about 5 feet across in the fore and aft direction. In order that the cutter head may operate at full capacity and at the same time not dig so deeply into the bottom as to clog or anchor the vessel, it must be completely under the control of the operator as to working depth. For this purpose it is suspended from the stern of the ship by wire ropes. There are two of these ropes. One end of each is made fast on the ship, from which point it passes over a bracket at the stern, drops to a sheave on the cutter head and returns to a sheave in the bracket. From there it goes to one of the two drums of the winch, which controls the depth of cut. Between the stern sheaves and the winch, the ropes pass over the sheaves of an equalizer device which keeps the tension the same on each.



Tug "G. R. Geary" built by the Polson Ironworks Co., Limited, Toronto.

The central winch is of a type which enables one man to regulate the depth of cut with practically no physical exertion, to change the position of the cutter from moment to moment as may be required, and to raise or lower the heavy head and suction pipe as he pleases. It was designed and built by the Lidgerwood Manufacturing Co., of New York, specially for this work. It is a double side-by-side drum winch of the steering engine type; in fact, except for a difference in the drums, it is almost a duplicate in design of the many tiny steering engines built by the Liderwood Manufacturing Co., for the United States torpedo boat destroyers, except that it is of greater size and power. It has the same compactness of design, reliability and ease of operation and high quality of material and workmanship called for in steering engine practice, and the control is through a hand wheel of equivalent type. The engine itself is controlled by a reverse valve system. By merely turning the control wheel the operator raises or lowers the cutter head as desired, the drums following closely the movement of the wheel and holding the weight of the head and suction pipe at any point where the wheel is left at rest.

The engine has two upright cylinders, each 12 inches diameter by 12 inch stroke. To the crankshaft is coupled a Hindley worm made from a steel forging, which is provided with roller thrust bearings. The worm wheel is of bronze. There are two spirally grooved drums, made fast, one on either side of the worm wheel, on which the lifting ropes are coiled. The engine has a lifting power of 40,000 pounds—20,000 pounds on each drum—and it hoists at a speed of 50 feet per minute. The winch is shown in the accompanying illustration made from a photograph taken in the Lidgerwood shops after the engine was tested and officially inspected.



Central Winch on Dredge "New Orleans."

Pacific Coast Letter

By George Bulkeley.

THE one topic of conversation in marine circles is "Panama Canal." All along the Pacific Coast, the buckets of dredgers are ceaselessly revolving, while pile drivers, hammers and concrete mixers churn continually. Each and every Pacific port is preparing to handle its share of the ocean-borne trade which the shortening of the passage from the Atlantic to the Pacific will bring to this coast. Victoria and Vancouver, B.C. are not behindhand in the preparations which are everywhere being made to receive the freight-laden argosies which will steam through the highway cut in the Isthmus of Panama, and already work has begun on a million dollar dry dock at North Vancouver, where the Norton Griffiths Construction Co. are putting up the preliminary reinforced bulkhead; on completion of which latter, the Puget Sound Bridge and Dredging Co. will commence dredging and preparing the foundation upon which the great dock will be finally erected. A twenty million dollar harbor scheme which is reported to be under favorable consideration in government quarters, is also being pushed forward by some well-known British Columbia business men, with Mr. C. F. Pretty at their head. This gigantic enterprise takes under its scope the dredging of the mouth and delta of the Fraser River, and the establishment of a very city of wharves, docks, railroad freight yards and trackage on Sea Island, one of the delta islands of the Fraser.

At Victoria, too, the most efficient method by which to increase the harbor and shipping facilities is also under animated discussion; and the much-talked of railroad bridge connecting the mainland with Vancouver Island is again to the fore; while Quatsino Sound, with its splendid and easily navigated harbor, and its freedom from the west coast fogs, is spoken of as a possible future terminus for Canada's Pacific trade.

British Columbia Shipping Retrospect.

At this period in the history of British Columbia shipping, when, from every indication, the tonnage entering and clearing from B.C. ports is about to be doubled and trebled by reason of the cutting of the Panama Canal, it is interesting to go over in retrospect the advance which has been made up to the present date in the number and quality of Canadian-owned steamships plying into B.C. ports, from the early days when Victoria was a Hudson's Bay Co.'s fort, and the city of Vancouver was non-existent.

The first Canadian-owned steamship to churn the waters of the Pacific was the famous Beaver, a sidewheeler built in 1836 on the English Thames, and put into commission by the Hudson's Bay Co. in 1860, to provide communication between their Pacific Coast stations for mail, passengers and freight. The Beaver was, therefore, at once the first Canadian-owned mail packet, passenger liner, and freighter to ply in B. C. waters, and, with these distinctions, combined that of being periodically leased to the Imperial Government for the purpose of hydrographic surveys, from which some of the earliest naval charts of the North Pacific coast were made. Once wrecked, once on fire, and, during her latter years a towboat, she finally became a complete wreck on the treacherous rocks at the entrance to the Narrows leading into Vancouver Harbor, and so ended her notable career in 1883.

Thirteen years after the Beaver began her cruises in B.C. waters, the Hudson's Bay Co. found it necessary to supplement the former vessel by the addition of the S.S. Otter to their fleet of one steamship. This old vessel was carrying passengers between Victoria and New Westminster in 1877, and brought up at her last anchorage as a coal hulk in 1885, being then the property of the newly formed Canadian Pacific Navigation Co. In 1858 steamships began to ply on the River Fraser, and, partly due to the gold rush there, a fleet of some six side and sternwheelers soon had their home port at New Westminster. From 1870 to 1885 the famous steamship Eliza Anderson figur-

ed prominently in the keen rate wars for the American-Canadian steamship traffic; she being eventually sold to the Hudson's Bay Co. at Victoria.

The first Canadian-built steamship to ply between B.C. ports was the stern-wheeler Governor Douglas in 1859, and later the Sir James Douglas in 1865; this latter year also saw the inauguration of the now indispensable pilotage for B.C. and Puget Sound waters. With the Canadian Pacific Railway came increased prosperity in every branch of trade in British Columbia; and, in 1883, the Canadian Pacific Navigation Co. was formed with a fleet of some dozen vessels of various shapes and sizes, including the redoubtable Otter.

From 1883 to the present date, shipping has steadily increased in B.C. waters; and the marvellous growth of Vancouver, for many years the only western mainland port of Canada having all the Dominion's westward bound trade coming through it, has induced more and more of the premier shipping companies of the world to make Victoria and Vancouver regular ports of call for their ships.

The C. P. R. Pacific Fleet.

In 1891, the importance of the Empire's trade with China and Japan, and the rapid rise of Hong Kong to the position of one of the first ports of the world in figures of tonnage entering and clearing, in trade returns, and as the most important British outpost in Eastern Asia, induced the C. P. R. Co. to commence a Royal Mail Steamship Line from Vancouver to Hong Kong, by way of Japanese ports and Wusung, the port of Shanghai. In this year, the twin-screw Empress of India came out spick and span from the yards of the Naval Armaments & Construction Co. (now Vickers, Ltd.), England, to inaugurate the Vancouver-Hong Kong run, which she and her famous twin sisters, the Empress of China and the Empress of Japan, have carried on ever since with the regularity of a railroad schedule.

These beautiful vessels require no description, having been photographed and painted from every point of view; but to this present day there is no sight to better gladden the heart of a lover of ships than a Pacific "Empress," showing the green seas cleaving into foam under her clipper bow, and her symmetrical white hull, with its pink waterline and yellow ochre superstructure, riding the swells with the impressive grace that her name implies, an ever fresh tribute to the master hand that designed her, and placed her masts and stacks at so exactly the right angle of rake that an inch either way would spoil the picture.

Between 1891 and the present year the Canadian Pacific Railway Co. have operated a steadily increasing fleet of B. C. coasting steamships, including wood and composite vessels built in B.C., and the larger, faster and more luxurious steel vessels built in the premier yards of England and Scotland. Among these we note the composite single-screw craft, Joan, Charmer, Princess Royal, Princess Beatrice and smaller boats; the single-screw steel vessel Tees; and the twin-screw vessel Princess May, a deep-sea vessel, built and engined by Messrs. Hawthorne Leslie & Co, Newcastle, England.

Later, there came the famous pair of twin-screw Princesses, the Princess Victoria and the Princess Charlotte, from Swan, Hunter & Wigham Richardson, Tyneside; and the Fairfield Yards, Clydeside, respectively. These fine vessels have three stacks, representing their three ports of call, Vancouver, Victoria and Seattle, and are now carrying on a most efficient 18-knot triangular service between these three cities. The latest additions to the C.P.R. Pacific Coast fleet have been the twin-screw Princess Mary (from the Paisley Yards), which is taking the Vancouver Island East Coast run), and the single-screw fast passenger vessels Princess Adelaide and Princess Alice; both of which are burning oil fuel in their boilers, and are about to operate a nightly cross service between Victoria and Vancouver.

G. T. P. Steamships.

During the past two years the Grand Trunk Pacific Ry. Co. have established wharves and docks at Victoria, Vancouver and Seattle; and are now operating a fine pair of twin-screw steamships built of steel by Swan, Hunter & Wigham Richardson, and having three stacks similar to the C.P.R. Princesses. These vessels are running on a 17-knot service between the company's Pacific terminus, Prince Rupert, and the three cities above mentioned, and are named the Prince Rupert and Prince George.

The Canadian West Coast has now an Empress Line, a Princess Line, and a Prince Line; all vessels being of the very highest class and rating 100 A1 at Lloyd's. Rumor has it that before very long a Duke Line will also be inaugurated by the enterprising Canadian Northern Railroad Co., and that the G. T.P. Prince Line may be extended to trans-Pacific vessels.

Meanwhile, the C.P.R. have purchased the fast triple-screw turbine steamship Queen Alexandra for their Vancouver-Nanaimo service; which fine vessel is from the well-known Denny yards, and will be here via Cape Horn very shortly. Two new large trans-Pacific steamships are also being built to replace the famous trio of Empresses, already referred to, so that when the opening of the Panama Canal shall revolutionize Pacific Ocean shipping the west coast of Canada will be well prepared all round.

SHIPBUILDING AND MARINE ENGINEERING.

MR. JOHN KENNEDY, in his Presidential Address, before the Society of Engineers, London, Eng., took, as the subject, shipbuilding and marine engineering, and indicated the lines along which future development might be expected. He referred to boats constructed by the Egyptians, to the improvements carried out by the Greeks and Romans, and also to the warships capable of undertaking voyages of 2,000 and 3,000 miles, which had been built by the Norsemen.

Coming to modern times he showed the growth in the size of vessels during the last 50 years, and gave the tonnage of the largest steamers in existence in each year since 1858. In that year, the premier position was held by the Great Eastern, of 18,915 tons, after which came the Scotia, of 3,871 tons, in 1862-1873. The tonnage was shown to have increased gradually until last year, when the Olympic, of 45,234 tons, was completed.

Superheating.

After discussing the Frahm anti-rolling tank, the increase in the size of docks, the higher boiler pressure necessitated by the introduction of the screw propeller, and the development of the turbine, he remarked that the steam engine, being a heat engine, depended for its maximum possible efficiency on the range of temperature available, and the obvious method was to increase the initial temperature of the working fluid. Practical considerations limited the boiler pressure, so in recent years renewed attention had been given to superheating the steam. Particularly had this been the case on the Continent of Europe where the Schmidt system had been largely in use for locomotive and marine purposes. In the beginning of 1910 he recommended his firm to adopt this system in one of their steamers, the Luque, and the consequent economy had been rather surprising. The consumption of coal, as compared with the previous performances of the vessel, had been reduced by about 20 per cent. over a period of 12 months. During this time, the vessel had steamed 31,090 miles on a coal consumption of 2,065 tons, while her sister ship using saturated steam made a distance of 29,697 miles on a consumption of 2,937 tons. In this case he was fortunate in having a man to start this new departure, who, as chief engineer, took a very warm personal in-

terest in its success. The boiler pressure was 175-lb per sq. in., the temperature of the steam was 590 deg. F., the temperature of the funnel gases was 480 deg. F. at about one-third the height of the funnel above its base, the temperature of the feed water was 150 deg. F., and the i.h.p. was 690. These figures were averages for the voyage. The advantage to the shipowner was increased beyond the monetary value of the coal saved owing to the extra cargo that could be carried in its place. Encouraged by the foregoing performances, the owners had fitted four more of their steamers with superheaters, and although the time was rather early to speak definitely there was every reason to expect similarly gratifying results.

The Internal Combustion Engine.

He then referred to the internal combustion engine. The saving of weight with the oil engine type was a great consideration for marine purposes, while on the other hand recent developments in the gas engine had rendered possible the utilization of the more common fuel—namely, bituminous coal. The absolute requirements of a marine engine were that the engine should be completely under control at any time and under any conditions; that it should be possible to start, stop, or reverse instantly and to vary the speed to any required extent between full speed ahead and full speed astern. While these conditions had no doubt been sufficiently met for the very small engines, as found in canal and fishing boats, it could not be said that a satisfactory solution had been found in the case of the larger types.

The success of the oil engine for fishing boats was assured, for an ordinary first-class sailing boat could be supplied and fitted with an oil engine for little more than half the cost of a steam drifter. The speed obtained was very little less, while there was great economy in fuel consumption, as the oil engine used fuel only when driving, while the steam drifter must lie under banked fires to be ready for action when required. A very strong company had been formed to apply this principle to the propulsion of barges on canals. The consumption of oil, ranging from petrol to the residual oils, for power purposes must be enormous, and although new fields were being opened up, as yet it was uncertain whether sufficient quantity was available to supply the motive power for our mercantile marine, and for the many other uses developed in modern practice.

Oil fuel was used largely by the British and other navies, in the furnaces of steam-driven craft, but so far, possibly owing to the difficulties of supply, had not been extensively used in the Mercantile Marine. The advantages claimed by the advocates of the oil engine for marine work were:—(1) Less space occupied; (2) no "stand-by" losses; (3) engine-room staff largely reduced; (4) less weight of fuel carried and less weight of machinery, consequently more cargo capacity; and (5) elimination of a large number of auxiliaries required for the steam engine.

Electric Transmission.

Among other systems might be mentioned the electric transmission of power from a generating station amidships to a motor aft, driving the propeller. The objection for moderate speeds had been that the weight of the motor would be considerable owing to the low number of revolutions required when direct-coupled, but this might be overcome by gearing down.

Valuable research work in progress pointed to a much better understanding of the correct dimensions and form of the high-speed propeller. The prime movers in this case could of course be steam or internal combustion engines, and as the power required could be divided in any required number of units, it could be arranged that only the sets necessary for any speed were in use and working at their most efficient load. This would appear to be a valuable quality in war vessels when cruising.

Diesel Marine Engines.

The address concluded with some brief remarks regarding the use of the Diesel engine in ships. This engine was probably the most economical at present known, the consumption of oil being about ½-lb. per b.h.p. hour, while a further advantage was its ability to make use of cheap residual oils. In common with other engines it was subject to the difficulties of reversing, which was accomplished in the smaller types by mechanical gearing, although recent improvements were likely to overcome this obstacle. The Vulcanus, a vessel of over 1,000 tons register, fitted with Diesel engines of the four-stroke cycle had already made several voyages with good results, and at the present time about a dozen vessels to be fitted with oil engines, mostly of the Diesel type, were projected or being built. These were vessels of considerable size, ranging up to as much as 8,000 tons gross register (it was also reported that a 14,000 ton vessel was being built on the Continent), and if, as there was no reason to doubt, the results proved satisfactory, there would in consequence be a considerable reduction in the cost of sea transport.—T.E.S.

REID-NEWFOUNDLAND CO. STEAMSHIP BRUCE.

THE Reid-Newfoundland mail and passenger steamer Bruce, launched by Napier & Miller, shipbuilders, Old Kilpatrick, the Clyde, Scotland, on December 9 last year, arrived at St. John's, Nfld., recently, after fitting-out and undergoing a series of highly successful trials at the hands of her builders and



Reid-Newfoundland Steamer "Bruce" being Launched.



Reid-Newfoundland Steamer "Bruce" immediately after the Launch.

engineers. The vessel has been specially designed and constructed for service in waters more or less subject to large quantities of floating and field ice, and is expected to prove of great value in demonstrating the possibilities of winter navigation across Cabot Strait and indirectly, of similar navigation in the St. Lawrence river and gulf.

Her principal dimensions are 250 by 36 by 25¼ feet, and her gross tonnage 1,700. Accommodation for 70 first-class passengers is provided in staterooms on the upper deck amidships, together with saloon, music room, entrance hall, ladies' cabin and smoking room. The after 'tween decks, and a deckhouse above on the awning deck, are fitted up for 150 second-class passengers. The triple expansion engines, by Messrs. J. G. Kincaid & Co., Greenock, have cylinders 25, 42 and 68 inches diameter by 45 inches stroke, and are supplied with steam by four cylindrical boilers.

Of late years the question of winter navigation of the St. Lawrence has taken on a new interest for Canadian people through the providing of ice breakers by the Dominion Government for use in the river, but it has not yet been found feasible to operate ocean liners in the Gulf from December until April or May, according as the spring opens early or otherwise. The new steamer Bruce is, however, expected to prove a revelation in this respect, and her advent will be watched closely by those interested in this matter; the probable result being the construction of passenger steamers for the St. Lawrence henceforth, along similar lines, so that by their operation, together with ice-breakers, navigation of the river and gulf for a longer period in each year may be ensured.

The First "Bruce."

In 1897, Sir Robert Reid had the steamship Bruce built at Glasgow, to serve as the connecting link between the Reid railway system in Newfoundland and the Intercolonial railway system in Canada. Her route and schedule was to ply every other day between Port aux Basques, Nfld., and North Sydney, N.S. She was built of special design and in excess of Lloyds requirements. The result was that for 13 years she maintained unbroken connection the whole year through; nine seasons between Port aux Basques and North Sydney, and the other four utilizing Louisburg, when the mighty ice pack from out the Gulf so blockaded the Cape Breton coast that it would have involved too much time to attempt to force into North Sydney.



ANDREW ALEXANDER ALLAN

In March, 1911, this ship was lost on the Nova Scotia coast and at once the Reid Company placed the order for a new and improved Bruce, at a cost of $350,000, and which is the subject of our sketch.



Reid-Newfoundland Steamer "Bruce" on the Stocks.

ANDREW ALEXANDER ALLAN.

It goes without saying that every young man should begin life with a high standard of attainment before him, to which he steadily should conform, with an unalterable determination to make the best of himself in whatever circumstances he might be placed. This was the principle which the subject of this biography adopted as his guiding star, and this ambition is what has made him the occupant of the commanding position he holds at present. He truly earned every promotion he received and each advancement made him more ambitious for the next one higher up. He deserved the success has has met, and he is a thorough exemplification of what a man can do, when he starts out with the determination "to get there." Andrew Alexander Allan was born June 16th, 1860, at Montreal, Canada, a son of Andrew and Isabella Ann (Smith) Allan; the former being of Scotch descent, and the latter of Scotch Canadian. His education was obtained at Rugby, later in France by private tutors, and at the high school of Montreal. He began his business life as an office boy in the employ of The Allan Line in 1877, and has worked his way up from the lowest to the highest position in that corporation. He is also president of the Shipping Federation of Canada, presi-

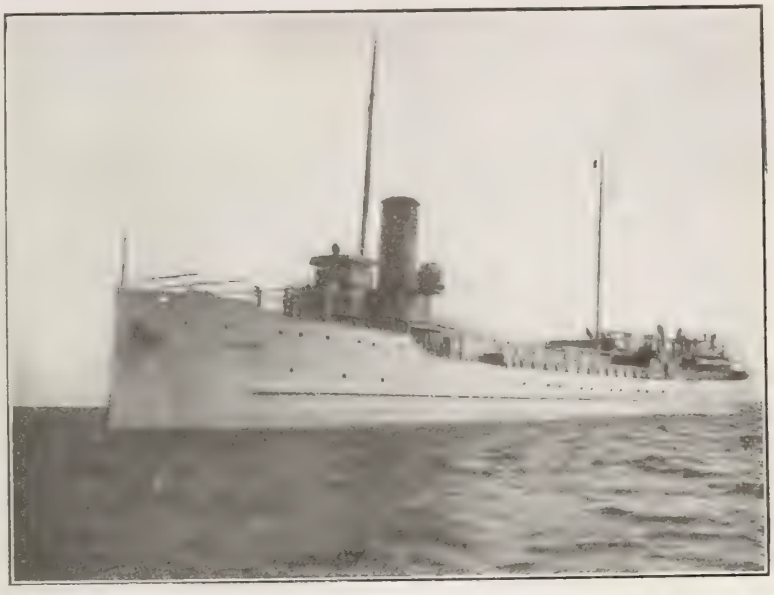
dent of the Canadian Marconi Co., President of the Dominion Dry Dock Co. and a director of the Merchants Bank of Canada. He finds a little time for club life, being a member of the following clubs:—The Montreal Jockey, Montreal Hunt, Mount Royal, St. James and Forest and Stream, all of Montreal; also of the Garrison Club, Quebec, the Rideau and the Country Clubs, Ottawa. Mr. Allan was married to Charlotte Elizabeth Torre, June 3rd, 1886. There are two daughters, Isabella Hazel and Doris Forsyth (now Mrs. Russel Cowans, of Winnipeg, Manitoba).

SUCTION DREDGE 'NEW ORLEANS'

By Levy McMillan.

SOME very interesting preliminary trials have just been completed in Cape Cod Bay, Mass., on the United States Government suction dredge "New Orleans." This is the largest sea-going suction dredge yet built in America and is intended for use on the southwest pass of the Mississippi river, where it will have to deal with enormous accumulations of sand and mud brought down by the river and rapidly deposited at the entrance outside the jetties.

The dredge is of the Fruhling suction hopper type and was designed by John Reid, of Montreal and New York, for the Corps of Engineers, U.S.A., who control all harbor and river developments on the United States seaboards. The hull of the twin screw sea-going type, is 315 feet long by 50-feet beam by 26 feet depth, and carries 3,000 cubic yards of sand in its hopper. The stern of the vessel is split up the centre by a dredging well, in which the suction arm and dredge head are fitted, containing the twin suction pipes, 26 inches diameter. These join at the outer end of the arm in a massive dredge head 18 feet broad by 5 feet deep, in the form of an inverted dipper bucket, which ploughs off the material to be pumped before it comes within the control of the suction forces. The inner end of the suction arm is secured to the vessel by a massive hollow trunnion cross-bearing, to which the pump suctions are connected in the engine room.



U.S. Government Suction Dredge "New Orleans."

There is a very complete outfit of Babcock & Wilcox water tube boilers generating steam for four sets of main engines, two of which are coupled direct to the propellers and two to the dredge pumps. The dredge pumps are of the special Fruhling type, having suction and delivery pipes 26 inches diameter arranged to pump through the dredge head or from the hoppers. All valves in these pipes are operated by hydraulic cylinders. The pump casings and impellers are made of cast steel. The blades on the impellers, four in number, are protected by false pieces of manganese steel, the inside of the pump being also lined with manganese steel ½ inch thick. On the mud trials, large quantities of stone were encountered, one of which passed through the pumps and measured 22x12x7½ inches.

By an ingenious arrangement of clutches, it is possible to couple up the pumping engine to the propelling engines so that all four sets can be used on the propeller shafts when high speed at sea is required. The engine room is well arranged and is complete with all necessary auxiliaries. These include one main condenser and two independent centrifugal circulating pumps and one independent air pump. The feed water is supplied to the boilers by two vertical duplex pumps controlled by a float in the hot-well. Two pumps of the same size and type are used in connection with the hydraulic system, but these can also be used for feeding the boilers when necessary. The feed water is heated on its way to the boilers by passing through a large feed heater of the surface type, exhaust steam being used for the purpose.

One large duplex pump is used for general purposes and to supply water to the ash ejectors, two of which are fitted in the stokehold, one discharging into the hopper for use in port.

There are two horizontal duplex pumps for forcing water into stern tubes and dredging pumps—one fresh water and one sanitary pump. Fresh water is supplied when the dredge is in operation by two ten-ton evaporators. For supplying water to the dredge head when the mud is too thick for dredge pumps to handle, three large duplex pumps are



U.S. Government Suction Dredge "New Orleans."

fitted and connected to the dredge head by a 12-inch main.

The electric installation consists of two Curtis turbines, either of which is capable of supplying all lights and various motors for ventilation. There is fitted in a room by itself a motor-driven refrigeration machine, having a capacity of 10 tons of ice per day.

The accommodation is complete in every respect, particular attention being paid to ventilation in the matter of screens to outside doors and windows. A telephone system connects the wheelhouse with all the officers' rooms and engine room. Blake pumps are fitted throughout the ship, while the evaporators, feed heaters, etc., are by the Griscom-Spencer Co., of New York.

In the preliminary trials, remarkable pumping efficiency was demonstrated, both in sand and mud. The hopper was loaded with sand in 55 minutes and the contents pumped overboard through the hopper discharging pipes by the dredge pumps in 60 minutes. In mud, even a greater pumping capacity was shown, and it is anticipated that the dredge will easily surpass its guarantees of performance by 50 per cent.

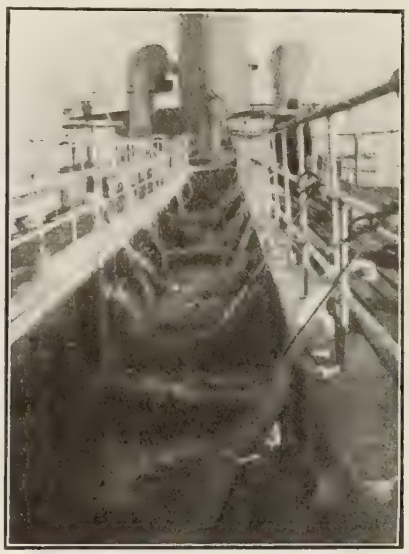
The dredge was built by the Fore River Shipbuilding Co., Quincy, Mass., who carried out the trials under the supervision of F. Ewig, for the inventor, and Levy McMillan for the designers.

SHIPPING FEDERATION ANNUAL MEETING.

THE publication of actual, instead of average depths, in the ship channel of the port of Montreal was advocated at the annual meeting of the Shipping Federation. The president, Mr. Andrew A. Allan, occupied the chair.

Details of Report.

The lights and buoys under the control of the Department of Marine and Fisheries have given general satisfaction during the year, all defects found having been notified and remedied promptly. To show the quality of this service, only thirteen defects in aids to navigation were reported by masters of

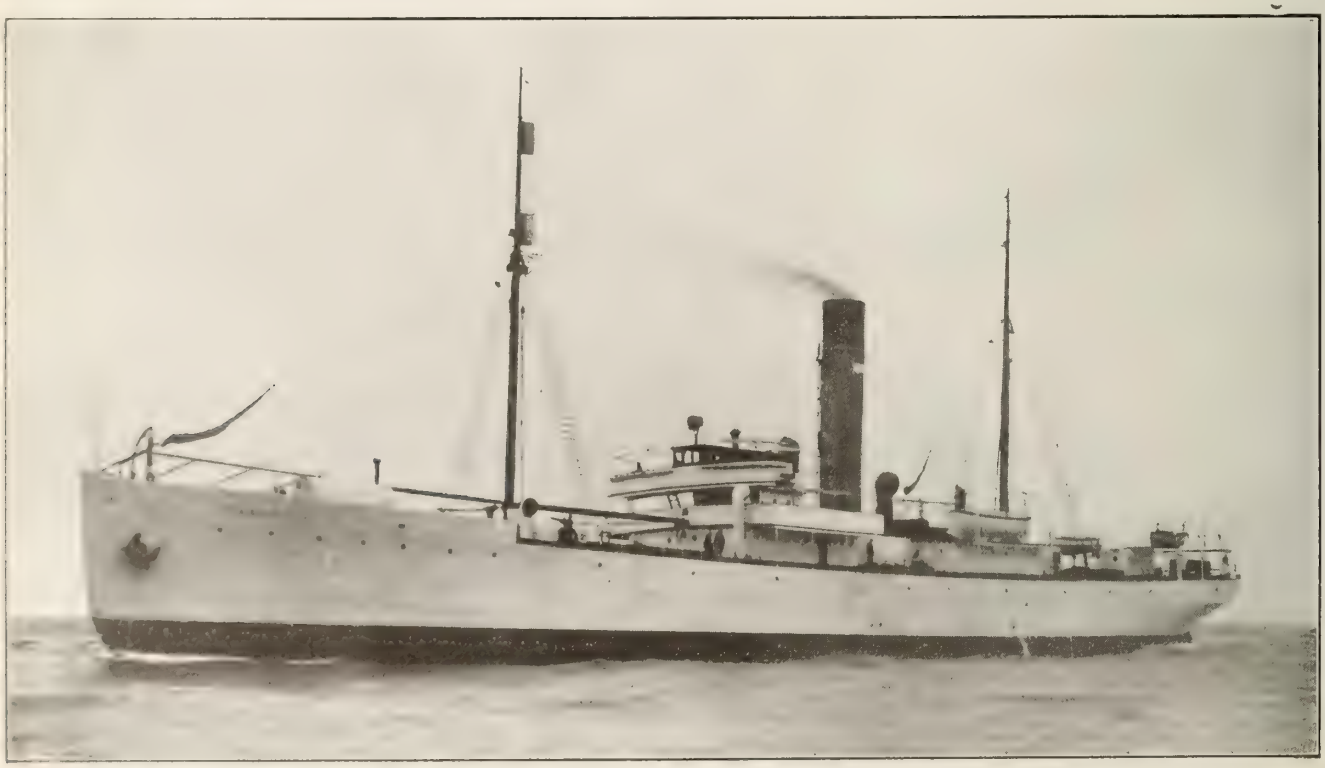


U.S. Government Suction Dredge, "New Orleans."

vessels during the year. We have several times called the attention of the Minister of Marine and Fisheries to the urgency of completing the ship channel at Cap a la Roche, the most dangerous part of the river, and we wish now to put on record our disapproval of dredges being employed elsewhere, which could or should have been employed at work at Cap a la Roche.

The lowness of the water in the harbor during the season again occasioned great anxiety to the shipping companies. We think that if a table was published showing the actual depth of water in the ship channel, instead of an average depth (which means nothing), shipowners would be in a better position to judge of whether they should increase the size of their vessels or not. The works undertaken by the Harbor Commissioners at the Guard Pier have had a very great effect on the current at the Victoria Pier, moving its position considerably, making its movements irregular, and thereby adding to the difficulty encountered in navigating vessels. This is a matter that requires very serious consideration, and before the works are carried further, proper enquiry should be made into their probable effect. On several occasions during the season, the congestion of freight on the wharves and sheds was very acute, and we are of opinion that no improvement will take place in this respect until a scheme of the kind proposed by this federation in 1909 is in force.

Various Parliamentary bills were considered during the year, and will be found in the report, as also a short resume of the International Marine Sea Law Association Conference. Our relations with Government departments have been most cordial, and we are greatly



...sailing steamer Nascopie, built and engined by Swan, Hunter & Wigham Richardson Limited, for Job Bros. and the Hudson Bay Co. A description of the vessel was given in our February issue.

indebted to the late and present Ministers of Marine and Fisheries for their hearty support to our proposals for the improvement of the ship channel and aids to navigation. Our thanks are also due to Mr. A. Johnston, the deputy minister, and his assistants, for their co-operation on many occasions.

Secretary Robb supplied the following analysis of the tonnage of vessels using the port: Tonnage of liners, 484,560 tons; of transients, 77,846 tons; total, 562,406 tons, as compared with a total of 505,387 tons for the previous year, being an increase of 57,019 tons.

Mr. Andrew A. Allan was re-elected president, and the following executive committee was appointed:—Messrs. J. R. Binning, D. W. Campbell, Alex. Dick, W. R. Eakin, E. W. Foulds, W. I. Gear, A. Mackenzie, R. W. Reford, Jas. Thom and V. Ward.

THE DIESEL OIL ENGINE.

THE following is an abstract of a paper read at the recent meeting of the British Association by Charles Day, Managing Director of Mirrlees, Bickerton & Day, Ltd., Hazel Grove, Stockport—makers of the Mirrlees-Diesel engines :—He said that the economical generation of power for industrial purposes depends mainly upon the following factors :—1. (a) The attainable economy of working at different loads of the prime mover itself, including boiler or gas producer, and all accessories, such as condensers, feed pumps, water pumps, etc. (b) The degree to which this attainable economy can be practically maintained under the conditions of working, and the load factor. 2. The stand-by losses, i.e., the expenditure necessary to keep the plant ready for work when wanted. 3. Wages of engine-room attendants, stokers, and other men employed about the power house. 4. Expenditure on lubricating oil, cleaning, waste, and sundry stores. 5. Cost of repairs and of the maintenance of all parts of the plant in good working condition. 6. The cost of water for condensing, and for boiler feeding in the case of steam plant, for the engine water jackets, and for the gas producer in the case of gas plant, or for the engine water jackets in the case of Diesel plants.

Actual Service Results Only Reliable.

From the mere enumeration of these items, it is very obvious that tests either on makers' works, or on site, even though the tests extend for a week or so, do not form a sufficient guide as to the real value of the engines for industrial purposes, and that a far safer, in fact, the only safe conclusion, can be formed from a study of results obtained in actual practice. For instance, it matters not how economical an engine may be in regard to fuel if the expenditure in other directions more than outbalances the gain in fuel consumption. In actual service it is not to be expected that a power plant can always be kept and worked at its highest efficiency. The average results actually obtained over a term of years differ considerably from those attainable under the very best of conditions.

The great difficulty most buyers find is in securing reliable figures of power costs from people engaged in trade, except in the case of electric supply stations. The writer does not know of any body of large power users who systematically prepare accounts showing their power costs on a uniform basis and publish them. This practice in connection with electric supply stations fortunately does give an independent and authoritative basis from which valuable deductions can be made, and this, combined with information obtained direct from station engineers, has enabled the author to determine the average results obtained in such stations. With different types of plant these averages, for stations having a plant capacity not exceeding 1000 h.p., are as follows :—

TABLE I.—Average Cost per B.T.U. Sold.

Type of engine.	Fuel.	Lubricating oil, waste stores, and water.	Wages.	Repairs and maintenance.	Total works cost.	Load factor.
Steam..	.45d	.06d	.25d	.26d	1.02d	14.7
Gas....	.43d	.09d	.28d	.24d	1.04d	15.3
Diesel..	.23d	.04d	.19d	.07d	.53d	14.3

The limit of 1000 k.w. was fixed owing to there being as yet no large electricity supply stations equipped solely with Diesel engines or gas engines. Of course, better results are obtained when driving machinery which gives a better load factor, but the causes which produce loss are as a rule, the same, though modified in extent. The general conclusion formed from a study of electricity stations holds good for the great majority of power users, though, perhaps, not applicable to some special trades, where engines can be run continuously on almost uniform loads. It is also necessary to point out that the figures include some items which should not strictly be charged against the power plant. For instance, the wages items include figures for men working on cables, street lamps, and in sub-stations, whilst the repairs items include repairs to such parts. Also it is necessary to mention that the figures give the cost per unit sold and not per unit generated.

The Diesel Engine Records Most Favorable.

From the averages it is clear that a substantial gain is obtained by the adoption of Diesel engines, as against either gas or steam engines, the figures being beyond doubt substantially accurate. It is also noticeable that the gain is not only on fuel consumption, but is practically in the same proportion on the other items of expenditure.

The great saving shown by these average figures is confirmed by repeated experiences of the author. In many cases, although the figures guaranteed with Diesel engines have been no better than figures previously guaranteed, and obtained on tests, with existing steam and gas engines, the Diesel engines have shown over extended periods a saving of 50 and 60 per cent., and in some cases an even greater percentage, the result being due to the fact that the Diesel engine's average working results were very much nearer to the guaranteed figures than with gas or steam engines, combined with the fact that the relatively high cost of working at light loads with gas or steam had not been sufficiently taken into account when considering the guaranteed figures.

When going through cost records to prepare the average figures previously given, the author noticed very wide differences of cost per unit, particularly in the case of the steam plant. He, therefore, had the average cost calculated for steam stations of different capacity, and as the results are interesting, they are given separately in Table II. The table shows the great improvement which follows increase of size with steam stations, or expressed in the reverse direction it shows how great is the disadvantage of small stations when steam power is used.

Small Diesel Stations Highly Competitive.

It is further to be noted that even with the largest steam stations, the costs per unit generated are no better than for quite small stations using Diesel engines, and this in face of the improved load factor. This is a most important point, and shows that small Diesel stations can profitably supply at prices hitherto thought to be obtainable only in densely-populated centres having large power stations. In all cases the figures which have been given are works cost, and do not include anything for interest on capital and depreciation. It is hardly possible to give a definite statement showing the cost of constructing and equipping power houses of different types, as there are so many variable factors. However, the author's experience of a considerable number of estimates indicates that up to a capacity

of, say, 1000, k.w., there is generally little difference between the gross capital expenditure required, whether steam, gas, or Diesel engines be adopted.

TABLE II.—Average Works Cost per B.T.U. Sold on Steam Stations of Different Sizes.

Capacity of station not exceeding	Fuel.	Lubricating oil, Water, Waste, and stores.	Wages.	Repairs and maintenance.	Total.	Load factor.
K.W.	d.	d.	d.	d.	d.	
250	.63	.09	.35	.36	1.43	13.2
500	.56	.06	.27	.29	1.18	13.3
750	.48	.05	.23	.24	.95	15.4
1.000	.40	.05	.23	.21	.89	16.8
1.500	.42	.04	.17	.18	.81	16.9
2.000	.37	.04	.16	.21	.78	17.7
3.000	.33	.04	.15	.17	.69	17.4
4.000	.40	.03	.14	.20	.77	18.8
5.000	.34	.03	.11	.16	.64	18.7
7.000	.36	.04	.13	.20	.73	17.9
10.000	.26	.03	.09	.13	.51	22.6
20.000	.30	.03	.11	.16	.60	19.6
50.000	.23	.02	.10	.11	.46	20.56

Engines for Dynamo Driving.

Having now dealt with what may be termed the commercial aspect, it may be well to study briefly the constructional features desirable in engines for dynamo driving. For speeds which are not slow, engines of the multi-crank type become desirable, otherwise serious vibration is likely to be caused. For the same reason it is important that the distance between the centre lines of the cylinders of an engine be reduced as much as possible, and on this account the vertical construction is much more suitable than the horizontal, and gives much better accessibility. The vertical design is also better from the point of view of piston wear.

Very complete enclosing, combined with forced lubrication, is in the author's opinion an absolute essential for high-speed engines, whether steam, gas, or oil. With the first few oil engines to which forced lubrication was applied, a portion of the lubricating oil got drawn up into the cylinders. Improvements in construction have, however, completely overcome this, and now the oil consumption is quite as low with the forced lubrication as with the ordinary systems. For moderate speeds of revolution, ring lubricating main bearings are thoroughly satisfactory, combined with centrifugal lubrication to crank pins. With such an arrangement less complete enclosing meets all requirements of cleanliness. There is another point in regard to the multi-cylinder design of engine which should be mentioned, viz., that with this design a smaller diameter of cylinder is required for a given power than with a single-cylinder engine. With internal-combustion engines this is of great importance, as, after a certain size, every enlargement of cylinder diameter brings with it increased constructional difficulties and a greater liability to breakdown.

Features of the Diesel Engine.

Turning now to the particular features of the Diesel engine itself, Carnot enunciated the conditions required for a perfect heat engine, and Diesel propounded a scheme which to a certain degree met the Carnot conditions. The original cycle has become modified to that now adopted, which may, therefore, be claimed to be the nearest to the Carnot cycle which present-day practical limits admit. The heat efficiency of the Diesel engine, though far from perfect, is still much better than that of any other heat engine, as is readily seen from the fuel consumption, which is 0.44 lb. of fuel oil per b.h.p. per hour. The fuel consumption is also low at partial loads, viz. :—¾ load, 0.45 lb. ; ½ load, 0.47 lb.; and ¼ load, 0.62 lb. per b.h.p. hour.

These are not records, but every-day figures, and are for engines of quite moderate size. With larger engines the fuel consumption per h.p. is rather lower, but increase of size does not give anything like the improvement in fuel consumption that occurs with steam engines. This is a point to be remembered when fixing the size of engine to be adopted in a station. With steam plants the size of engine should be kept up, whilst with internal-combustion engines the size within certain limits can with advantage be kept down. Owing to the high economy at light loads it is often found distinctly advantageous to run a Diesel engine in preference to using a storage battery.

Nature and Grade of Oil.

The oil generally used is residual petroleum, i.e., the residue left from petroleum after the lighter oils have been distilled off. The increased demand for petrol will certainly tend to increase the further supply of residue, whilst the opening up of new oil wells in various parts of the world is steadily increasing the oil supplies. Not only is residual petroleum used for Diesel engines, but residue shale oil and gas-works tar oil are now much used. The fuel oil can be almost any of those in use for boiler firing, and a wide variety of oils can be employed with no alteration of the engine, this being probably explained by the fact that a pulveriser which will sufficiently pulverise a thick, viscous oil can easily pulverise the thinner oils. The use of oil fuel carries with it certain advantages in the way of ease of handling and of cleanliness. With coal it is difficult to avoid dust, and this is particularly objectionable in the case of steam plants. With oil there are no ashes to cart away, and thus handling of gritty materials is entirely eliminated. Usually the oil is pumped from an outside storage tank to the small tanks near the engines.

Long Periods Under Continuous Operation.

The question may naturally be asked whether Diesel engines are suitable for long periods of continuous running. In reply to this, the following instance may be quoted. At the Birkdale electricity works, a Mirrlees-Diesel was put down a little over four years ago. The station engineer recently made a return, which showed that the engine had on the average worked 23¾ hours out of every 24 hours throughout the four years, or an average stoppage of about 1½ hours each Sunday.

Numerous cases could be given of large savings effected, but the figures already given substantially prove this, and are, perhaps, more appropriate for a paper of this kind. It might be of interest to mention that the first Diesel engine built in Great Britain was a Mirrlees-Diesel engine, and was made over 14 years ago, consequently the present Mirrlees-Diesel engines represent quite a long experience ; and the present appreciation of this engine is not a temporary boom, but is based on substantial experience.

12TH INTERNATIONAL CONGRESS OF NAVIGATION

According to present arrangements, the delegates from the 12th International Congress of Navigation at Philadelphia, in May of this year, will become the guests of the Canadian Government at Fort William, Ont., and from thence be guided to the special places where their desires or interests may lead them, by representatives of the Marine and Fisheries Department. It is proposed that the trip eastwards be by way of the Great Lakes or the Georgian Bay Canal, visiting the Soo, Toronto, the St. Lawrence by way of the Thousand Islands to Montreal, the Soulange Canal, and sailing homeward via the St. Lawrence route. Facilities will also be offered those who desire to go westward through Canada, to take that trip under specially advantageous circumstances.

CANADIAN NAVY.

Commander Roper, who for the past two years has acted as chief of the naval staff of Canada, will shortly sever his connection with the Dominion service and return to the British navy.

PROGRESS IN NEW EQUIPMENT

There is Here Provided in Compact Form a Monthly Compendium of Marine Engineering Product Achievement.

THERMO-FEED BOILER FEED REGULATOR AND DIFFERENTIAL GOVERNOR.

ANYTHING that will reduce the range of water level in a steam boiler must of necessity tend towards economy, and it is stated that the new form of regulator, here described, gives full control from zero to full feed within a range of ⅛ inch of the water level. Fig. 1 shows the float directly coupled by pairs of levers to the control valve, which has been placed in a vertical position high up, and thus out of contact with any scum which might collect on the surface of the water. Furthermore, the valve and operating gear is made readily adjustable from the exterior for variation of water level, and is so constructed as to be easily taken to pieces for examination and repair. The particular method of making the double-seated valve and valve seats as a self-contained part enables a spare device to be kept in stock and changed at very short notice and in a few minutes.

The feed check valve control device is materially modified in the direction of substituting a cylinder and piston with a Sea Ring cup in place of a flexible diaphragm, and in arranging the spring at the upper part and at the side of the device away from the heat instead of about the valve spindle. This not only renders adjustment of the spring a simple and easy matter, but also leaves the gland nut free for removal for repacking without dismantling the device as a whole.

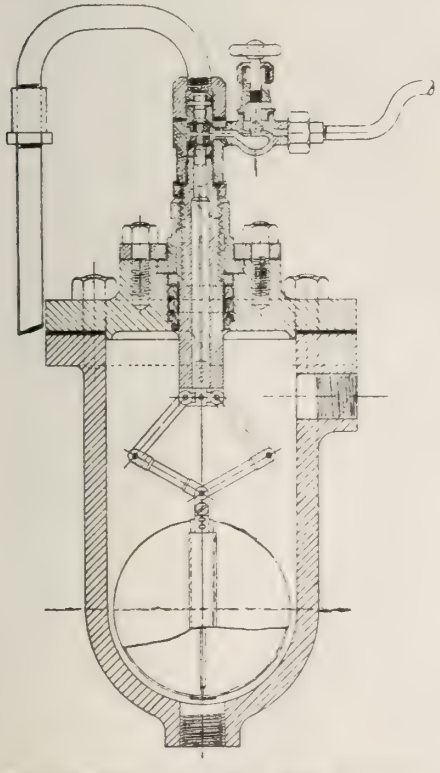


Fig. 1—Thermo-feed Boiler Feed Regulator.

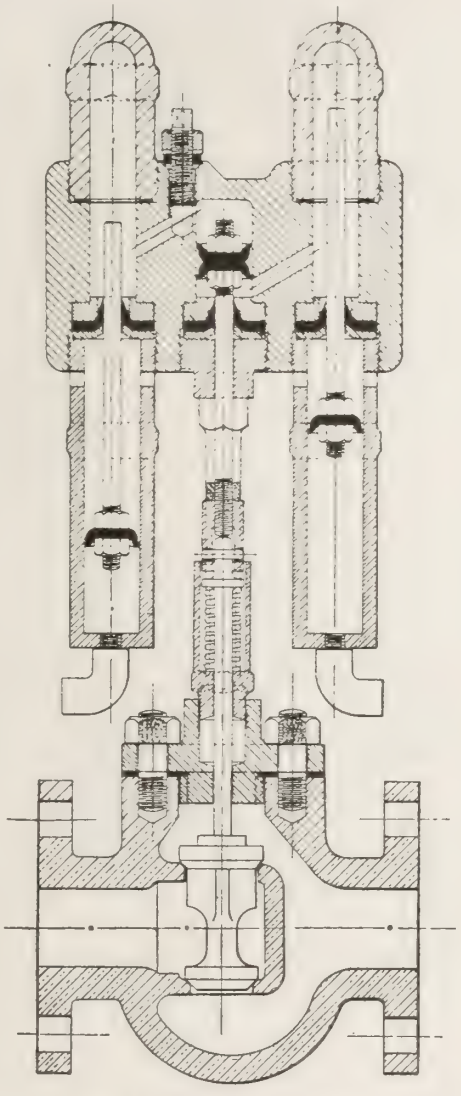


Fig. 2—Differential Governor.

The lever can be used, if necessary, for operating the check valve by hand for independent control, a tommy bar being inserted in the socket to increase the leverage if desired. In order to provide automatic means for controlling the admission of steam to the steam pump when feeding, for example, a battery of boilers fitted with Thermo-feed regulators, an ingenious form of differential governor has been designed, which we show in Fig. 2. The valve indicated here is the admission valve on the steam supply to the pump and is spring pressed so that it tends to open and admit steam to the pump. The valve spindle carries a piston at its upper end, which works in an oil cylinder, having an upper communicating passage leading to a left-hand ram and a lower passage leading to a right-hand ram. The left-hand ram is attached to a piston working in a cylinder connected with the feed pipe line and a similar piston in the right-hand cylinder is in connection with the steam pressure driving the pump.

So long as the pressure in the feed pipe line is only sufficient to feed the boilers, the steam valve to the pump is maintained open by the spring, but when the feed delivery is checked, the pressure rises and acts on the left-hand piston against the steam pressure on the right-hand piston, and the oil acting as the transmitting medium causes the valve piston to descend and close the steam valve more or less, until the flow of feed water into the boilers is again increased and the pressure reduced, when the differential pressure opens the steam valve again and the pump increases its rate of action.

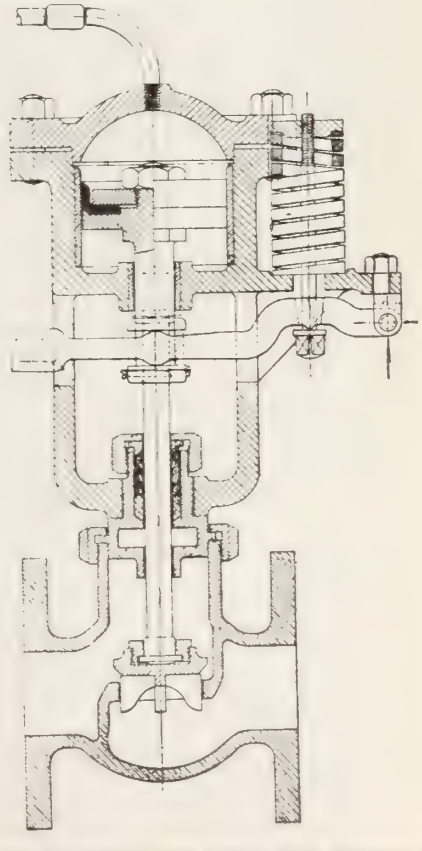


Fig. 1—Thermo-feed Boiler Feed Regulator.

By a combination of the two devices described, the supply of feed water to a battery of boilers by a steam-driven pump is automatically controlled in an absolutely reliable manner.

The apparatus is manufactured by Ronald Trist & Co., Lloyds Avenue, London, England.

STEAM TABLES FOR CONDENSER WORK.

PRESSURES below atmosphere are measured in a great many ways; in millimeters of mercury absolute pressure, in inches of mercury absolute pressure, in millimeters of vacuum, in pounds per square inch absolute pressure, in kilograms per square centimeter absolute pressure, in decimals of an atmosphere, in per cent. of a perfect vacuum, etc.

In this country the standard generally accepted is vacuum in inches of mercury referred to a 30-inch barometer. Ordinary steam tables, however, do not give pressures in vacuums, and there is no generally accepted standard of the properties of steam at say 28 or 28.5 or 29 inches vacuum, or of just exactly what pressure is represented by any given vacuum referred to a 30-inch barometer. It was with these points in mind that the publication, "Steam Tables for Condenser Work," just issued by the Wheeler Condenser & Engineering Co., of Carteret, N. J., has been prepared.

The meaning of the terms "vacuum referred to a 30-inch mean barometer" is clearly indicated, and it is then shown that in expressing pressure in these terms, the temperature of the mercury is assumed at 58.4 deg. F., whereas when atmospheric pressure is expressed in terms of a barometer of 29.92 inches, the temperature of the mercury is assumed as 32 deg. F. Following this discussion, three steam tables are given. In the first, the independent variable is vacuum, and the properties of saturated steam are given from 29.8 vacuum up to atmospheric pressure.

In table 2 the properties of steam below atmospheric pressure are given from 32 degs. F. to 212 degs. F., the temperature being the independent variable accompanied by the pressure expressed in vacuum in inches of mercury referred to a 30 inch barometer and also expressed in pounds per square inch and inches of mercury absolute pressure together with other properties of steam.

Table 3 gives the properties of saturated steam from zero to 200 pounds gauge, the independent variable being gauge pressure instead of absolute pressure, as usually given. The properties of steam may be read off, for instance, at a gauge pressure of 175 pounds without subtraction of 14.7 pounds from absolute pressures and without interpolation.

Following these steam tables, several pages are devoted to a discussion of the principle of the Mercury column and barometer, diagrams being given to show how a U tube is used to measure pressures above atmosphere and below atmosphere and how a closed tube inverted in a reservoir of mercury measures the pressures of the atmosphere. A section is then devoted to a discussion of the correction of vacuum column and barometer readings. The correction for thermal expansion of the mercury is discussed first, a formula being given for correcting the height of a column of mercury at any observed temperature, to the desired standard temperature.

In order to facilitate such corrections, a chart is also given, from which the correction to be added or subtracted from the barometer or vacuum gauge is obtained directly. The remaining pages discuss the corrections for relative expansion of scale mercury, for effect of altitude and latitude on standard gravity (and therefore the weight and pressure of the mercury) and finally the correction for capillarity.

This hand-book which represents a considerable expenditure in time and money is published by the Wheeler Condenser & Engineering Co., Carteret, N.J., primarily for the assistance of engineers using and purchasing condensers and condensing apparatus, to whom it will be sent upon request. Copies are not for sale or general distribution.

TABLE I. IN PART.

Vacuum in inches of mercury referred to a 30-in barometer mercury at 58.4 deg. F.	Temperature Fahr t	Specific volume cu. ft. per lb. v	Heat of the liquid H	Total heat of steam H	Entropy of water n	Entropy of steam N
[illegible]	[illegible]	918	36.40	1089.6	0.0713	2.0662
29.2	72.27	810	40.32	1091.3	0.0788	2.0548
[illegible]	[illegible]	724	43.88	1092.9	0.0855	2.0447
[illegible]	[illegible]	657	47.11	1094.3	0.0913	2.0358
[illegible]	[illegible]	599.3	50.00	1095.6	0.0968	2.0275
[illegible]	84.61	552.5	52.63	1096.8	0.1016	2.0203

DEFECTS IN H.M.S. LION.

The enormously high power turbines of the new battle cruiser Lion, which alone have cost half as much as a complete battleship of 15 years ago, are proving very expensive in more ways than one. The horse power of these engines is no less than 70,000, and on the first trials, which were run in rough weather, a maximum speed of 31.7 knots, over 35 miles an hour, was attained.

So terrific was the heat generated during the full power run that nearly every metal fitting on the bridge was twisted, and some of them, close to the funnel, actually began to run. The compasses were rendered useless, so much so that when the ship returned to the neighborhood of Plymouth it was deemed wise to keep her outside the Sound and wait for the daylight before taking her in. The fire control platform abaft the funnel was in no better condition. This, placed comparatively high up on the mast, was rendered untenable by the flames which poured from the funnel and rose to a height of 50 feet above it.

In consequence of these unpleasant experiences, the Admiralty have determined on the following alterations:—The tripod mast is to be removed and superseded by a pole mast similar to the main. The fire control gear is to be housed in the conning tower, which is to be enlarged by 20 feet in order to accommodate it. The foremost funnel is to be moved further aft, where its heat will not affect the navigation bridge. The estimated cost of these alterations is $125,000, and they will also have to be carried out on the battle cruiser Princess Royal, a sister ship to the Lion, which is approaching completion at Barrow.

OIL FUEL FIRED VESSELS.

One of the most remarkable developments of shipping in connection with the use of oil fuel is reported by the Liverpool Journal of Commerce. Contracts, it states, have been completed recently for the building of no fewer than twenty-one oil tank steamships of large dimensions, which will be adapted for the consumption of either coal or oil. Several of these are for American owners. The whole of the contracts have been placed in England. Nineteen of them have been apportioned as follows:—Armstrong, Whitworth & Co., two of 15,000 and one of 9,000 tons capacity; Swan, Hunter & Wigham Richardson, 2 of 15,000 and 4 of 9,000 tons capacity; Palmer's Shipbuilding & Iron Company, two of 15,000 and four of 9,000 tons capacity; William Doxford & Sons, two of 15,000 and two of 9,000 tons capacity.

MARINE ENGINEERING of Canada

A monthly journal dealing with the progress and development of Merchant and Naval Marine Engineering, Shipbuilding, the building of Harbors and Docks, and containing a record of the latest and best practice throughout the Sea-going World.

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Vol. II MARCH, 1912 No. 3

MONTREAL HARBOR PROGRAMME.

THE fact that two and a half million dollars is to be spent on improving Montreal's harbor this summer, and also that 3,000 men will be continually at work, or rather employed, wakes us up to the realization that things are being done on a big scale at Canada's National Port. The visitor of a few years ago would to-day be astonished to see the changes that have taken place, and it is likewise true that the future will see equally great and rapid developments.

The programme for this year is very extensive. Much attention will be given to the various grain elevator equipments, whose combined total capacity when finished will be 7,500,000 bushels. Grain elevator No. 2 is being rushed to completion, and will alone have a storage capacity of 2,600,000 bushels. When commenced it was planned for 1,000,000 bushels, but the grain congestion of 1911 made the increase necessary. In connection with this, the jetty at section 12, with conveying system, will also be completed. Grain elevator No. 3, on section 30, having a capacity of 1,000,000 bushels, and so located as to permit of liberal enlargement of the storage capacity when needed, forms a further projected constructional feature.

Considerable work is to be done on the new piers. The end of the summer will probably see the completion of Victoria Pier and Market Basin; giving 2,700 lineal feet of high level quays for ocean steamers, with a depth of 25 feet at low water, and 4,000 lineal feet of low level quays for river vessels. The Alexandra, King Edward, Jacques Cartier and Bickerdike piers will be extended. The enlargement of this latter secures 1,600 lineal feet of wharf accommodation along the Guard Pier. Two lift bridges will connect the main shore wharves with the Bickerdike and Guard Piers; giving vehicles and trains direct communication with the city, and thus avoiding the necessity of a long detour through Point St. Charles.

Considerable work will be done on the high level shore wharves, sections 30 and 35. These are 3,000 feet long, of average breadth 350 feet, and give a depth of 35 feet at low water. The high level shore wharves from the lower end of the new market basins, sections 23 and 30 of total length 3,600 feet with a low water depth of 35 feet, will also be added to and improved.

Permanent new sheds are to be erected on sections 23 to 30, also on sections 30 to 35. Sheds, equipment and conveyors from the Grand Trunk Railway elevator on new pier No. 7, will also be started. All new and extended wharves will be paved and railway tracks laid. The tracks from Victoria Pier to Racine Wharf will be raised above winter water level so as to be accessible all the year round.

Considerable dredging for harbor foundations will be carried out, and much filling in and reclamation work undertaken. The harbor will be deepened and widened inside the Guard Pier.

Perhaps, however, the most important work to be undertaken is the reduction of St. Mary's current. This will be accomplished by adopting a combination of two schemes. The present channel will be widened by dredging opposite St. Helen's Island and Ile Ronde, and a 22-foot channel will be dredged on the south shore of the former. In addition, the end of the guard pier is also to be moved out in such a way that more water will be diverted to the south side of St. Helen's Island.

There is, adsolutely, no doubt that when the current is reduced an immense trade in lighterage will spring up. At present all goods to be transferred to lake boats and barges must be handled by team through the city from the foot of the rapids up to the lake boats. With the advent of new conditions such traffic will go by water. The islets or anchorage mounds in the Laprairie Basin will, when completed, exert a highly beneficial effect when the ice breaks up. These, composed of dredgings and waste material, will be dumped in such manner as to hold the spring ice until melted, thereby accelerating the opening of navigation, with its resulting commercial advantages.

In another section of this issue will be found a brief, yet concise reference to the establishment by Vickers, Ltd., of a ship dock and marine plant at Montreal, and it may not be gainsaid that nowhere in our Dominion has there been shown such contagion of enterprise as that to be found in the great and growing Metropolis under the shadow of Mount Royal. Not only are big schemes launched there, but backbone and determination are always on hand, ready to carry them to successful completion. Waterways and shipping facilities are live questions in the field of practical politics for the people of Canada, and no "fencing" by governments or vested interests will stay their progress to a satisfactory settlement. Most things mix well with water ("oil" is an exception), therefore, let us see to it that every encouragement be given to every project which has for its object the harmonizing of the east with the west, and let us not lose sight of the fact that the much maligned Georgian Bay Canal scheme will contribute largely to this end, and consequently, to the general prosperity and greatest good of the greatest number. Montreal's port and harbor development is in the hands of those whose vision is that of a united, progressive and prosperous Canada.

WATER GAUGE GLASS PACKING HINTS.

By John Monerieff.

SINCE the introduction of high pressure steam boilers, breakage of Gauge Glasses has caused much annoyance and given rise to numerous complaints. Many suggestions have been made of introducing substitutes, but the question arises, would the substitute be any better, and may the Gauge Glasses now in use (if of good quality) not be sufficient for all that is required of them? I am of opinion that they are, provided always that the quality is good.

We have made a large number of experiments with the "Perth" Gauge Glasses and find that these will stand a hydraulic pressure of five thousand lbs. per square inch without breaking. You may take one of them in your hand by one end and insert the other into a flame that will bring it to a red heat in about half a minute, without breaking.

Causes of Gauge Glass Breakage.

Such being the case, the question naturally arises, why should a glass that will stand the variation of heat above five thousand lbs. hydraulic pressure, be broken with two or three hundred lbs. of steam pressure? To this it might be replied that in the one case the tests are done separately, while in the other the heat and pressure are combined. This looks like a formidable objection, but it is only so in appearance, as I am quite sure we will be able to prove that the glasses are broken neither by the pressure nor the heat, but by the expansion of the glass being interfered with.

Increased pressure of steam means increased heat, and the heat and pressure combined means an increase in the expansion of the glass. If the glass is locked too tightly, or in any way to interfere with its natural expansion, breakage is unavoidable, for it must break the moment it reaches the point of resistance.

With regard to the packing of Gauge Glasses there are a number of points to be noticed; first, you must have a good gauge glass. There are glasses that will not stand two hundred lbs. pressure, pack them how you may. Again, glasses must not be too full for the size of the gland. More glasses are broken from this cause than would be credited, if the totals were known.

In the second place, the gauge cocks must be set perfectly true, otherwise the glass will have too little space for expansion on one side. Further, the packing must be suitable and of the very best quality. Rubber washers, even of first quality are not suitable of themselves, with steam at 200 lbs. or more, because they get softened to pulp in a very short time and are blown out. To prevent this they should have a ply of asbestos twine or cords on each side.

The next point to be noticed is the screwing up of the glands. You should be able to move the glass with your finger and thumb after the screwing is finished. If you cannot do so the room for expansion is not sufficient and breakage will result. With the glass left easy there will be a little leakage when the steam is put on, but this will take up as soon as the glass and packing expands. To insure perfect safety, however, it would be as well to slacken the nut almost to the leaking point again. One point to be particularly noticed is, that the glass breaks most frequently at the steam end of the gauge cock, that is because the steam is hotter than the water and causes more expansion. This should be kept in mind when screwing up the glands. If these directions are followed, a good Gauge Glass should stand perfectly well in the highest pressure boiler that has yet been made.

Gauge Glass Hints.

As a proper packing of a Gauge Glass is so important to engineers and stokers, especially where high pressure boilers are used, I take the liberty of formulating these hints into a kind of rule:—

First, a good Gauge Glass must be used, which should not be too full for the size of the gland; second, a good rubber washer should be used, protected by a ply of asbestos twine on both sides; and third, the glass should be movable by the finger and thumb after the glands have been tightened up. The steam end of the glass should be left a shade slacker than the water end, and in every case the steam should be turned on gradually; and last, but not least, the whole operation should be carried out with intelligence.

This last instruction is quite as important as any of the others. Experiments have been carried out on a steam boiler with a working pressure of three hundred lbs. At first there were a great many breakages, but experience showed what kind of packing was required, etc., making it afterwards almost impossible to break one.

NEW LIGHTHOUSE ON BRITISH COLUMBIA COAST.

The Dominion Government Marine Department has let a contract for construction of a concrete lighthouse at Sherringham Point, on the northern shore of Juan de Fuca Strait. Lighthouses are already established at Carmanah and Otter Point, and with the new one in operation the entrance to the Straits will be made much more safe in thick weather. The lighting apparatus consists of a lamp, which gives a bare flame equalling 5,500 candles. The cut glass lens is six feet in diameter. The four sections of the lens are bolted together and fastened to a cast-iron table. The lens and table, weighing together approximately seven tons, are revolved by clockwork. To reduce the friction caused by this enormous weight revolving, the lens and table rest in a cast iron bath filled with mercury, which floats the entire weight so that it can be turned with very small energy. The complete revolution will be once every 20 seconds, and give four flashes during that time. The same type of apparatus and size is now in operation at Pachena, Estevan and Triangle stations, on the west coast of Vancouver Island.

CLYDE TUG'S THRILLING VOYAGE

OVER a month's continual strain, battling with bad weather, was the experience of the crew of the tugboat, Lady Inchcape which left the Clyde several weeks ago on a voyage to Colombo, Ceylon. The little vessel, which is only 100 feet long, came through weather that many a larger vessel has never experienced, and her safe arrival at her destination speaks volumes for the clever seamanship of her officers and crew. The tug, which was built by Messrs. William Denny and Brothers, Dumbarton, Scotland, for the Ceylon Wharfage Company, had a remarkable passage.

Immediately after leaving the Clyde she encountered what was only the beginning of a series of gales. For three days the vessel had a trying time in the Irish Sea. Heavy seas washed over the bow, and the holds, in which were stored the extra provisions, became completely flooded. The crew had to have recourse to the pumps and the Lady Inchcape was compelled to run into Rossclaire, in the South of Ireland. After being held up for three days the voyage was continued to Algiers.

A Terrible Gale.

While in the Bay of Biscay the tug encountered what proved, according to one of the crew, a regular storm. For five days the vessel fought against fearful odds, making little progress, sometimes only steaming one or two knots an hour. Immense waves broke over her, and she was constantly in danger of foundering. Owing to the shifting of the deck cargo of coal, the wash ports got jammed, and the tug took a heavy list to starboard. By order of Capt. Manning of London, the crew threw the deck cargo overboard, after which the tug righted somewhat.

The vessel next touched at Vigo, and on reaching that port there was only

one ton of coal left on board. After renewing her deck cargo she made an uneventful passage to Algiers. On the run to Port Said, which was accomplished in eight days, still more bad weather was encountered. Drawing only eight feet at the bow, the vessel was constantly enveloped in spray due to the high seas. The officers' quarters in the bow were flooded out and made uninhabitable, their belongings and the cabin furniture floating in several feet of water. Still the Lady Inchcape survived, and after going through the Suez Canal in eleven and a half hours, the initial two-days' run down the Red Sea was made in pleasant weather. On the third day, however, the storm again broke. During its continuance, the Medina, on board of which were their Majesties, and the escorting cruisers passed to starboard. Signalling between the Medina and the tug took place, both vessels dipping their flags.

The Closing Stretch.

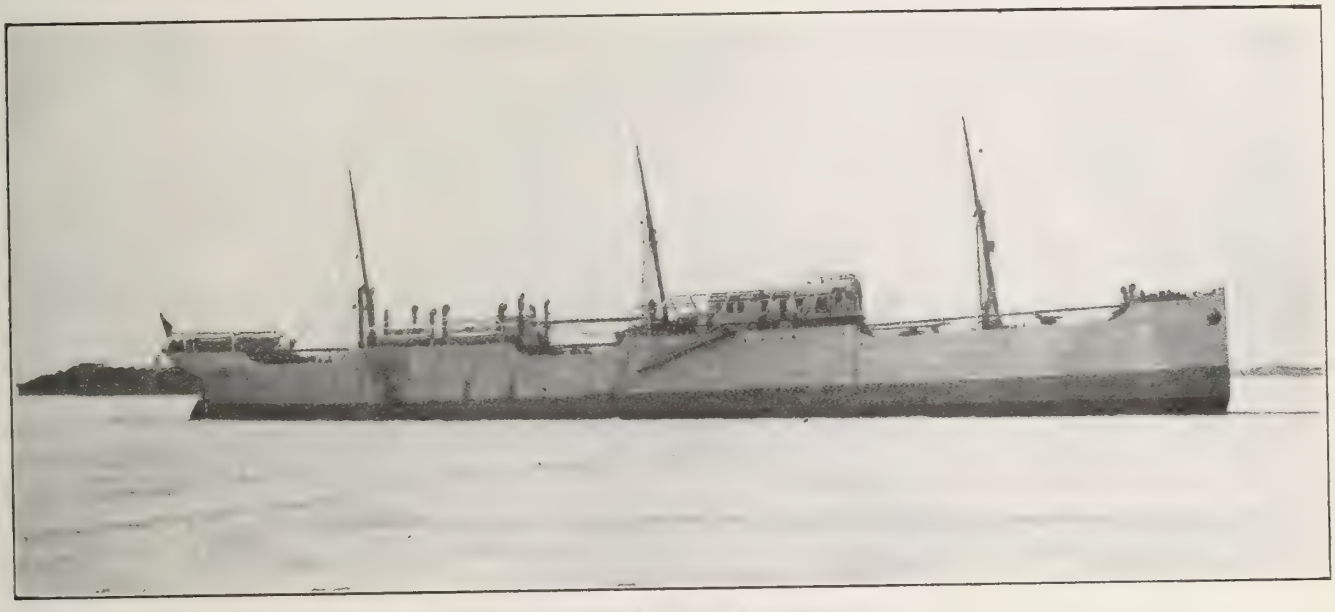
On reaching Aden, the Lady Inchcape was held up for over 30 hours before coaling, as all the fuel had been used by the Medina and her escorting cruisers. Colombo, the next port of call, was the end of the voyage, but before accomplishing her long journey the Lady Inchcape was swept by a north-east monsoon, which lasted nine days. For over a week she battled against the fury of the monsoon, and latterly reached port safely, only, however, to be ordered to the assistance of the Clyde Shipping Company's steamer Beachy, which had taken the rocks at Minicoy, but before her arrival the Beachy had floated. The passage out from the Clyde took 45 days, or eleven more than was expected, and during the voyage the daily consumption of coal was between eight and nine tons per day. Her normal speed is 10½ knots.

DIESEL ENGINE LINER "SELANDIA."

THE Diesel engine liner Selandia, a photograph of which, taken when completed, is shown herewith, has recently carried through a series of successful trials, and it is worthy of note that she is the first of three vessels, ordered by the East Asiatic Co., to be delivered by the builders. The sister ships, Jutlandia and Fionia, are being built by Barclay, Curle & Co., Glasgow, and Burmeister & Wain, Copenhagen, respectively; the latter firm being also the builders of the Selandia.

Ship and Machinery.

The Selandia is 370 feet long between perpendiculars, 53 feet in breadth, and 30 feet in moulded depth. With 7,400 tons deadweight, her displacement is 9,800 tons. Her gross tonnage is 4,900 tons, and her net register tonnage 3,200 tons. In the double bottom she can carry 900 tons of fuel. At sea with holds full, her speed will be over 11 knots, the i.h.p. being about 3,000.



DIESEL ENGINE LINER "SELANDIA."

Her propelling machinery consists of two eight-cylinder Burmeister & Wain oil engines working on the Diesel principle and the four-stroke cycle, driving twin propellers. With a cylinder diameter of 20⅞ in. and a piston stroke of 28¾ in., about 1,250 b.h.p. is developed from each engine at 140 r.p.m., which is the full-power speed of the ship. Each 8-cylinder engine has two groupings of 4-cylinders, the driving and controlling gear of the valve mechanism being located between. Again, each cylinder group has the cranks at 180 degrees, while those of the two groups are at 90 degrees to each other. The cylinders are mounted on a massive casing and through-bolted to the base.

All the valve gear is on the front of the engine. The valves are operated by overhead rocking arms supported by separate mandrels, carried in two standards mounted on lugs at the sides of the cylinders. Heavy brackets bolted to the top of the crank casing bear the camshaft and also a layshaft. From a camshaft the motion is taken to the overhead rockers by stiff hollow rods, on the foot of each of which is what may be termed a boot, in the heel of which is fitted the cam roller, and in the toe, a pin to which is attached a short connecting rod from a crank on the lay shaft that lies with a parallel axis to the camshaft.

Each cylinder has a starting-air valve, inlet valve, injection valve and exhaust valve. When the engine is standing, the layshaft is in the off position with all the rods and rollers clear of the camshaft. As soon as the order is given to start the main engine, this layshaft is turned, in amount something short of a half circle by means of a small air engine, mounted on the middle front of the main engine casing and driving through reduction gearing to a vertical shaft that rises to the level of the layshaft, which it moves through the medium of skew gearing. There are, of course, definite ahead and astern positions, and these are determined by the direction in which the small air engine is made to run.

Two auxiliary Diesel engines of 200 h.p. are installed for driving the lubricating, cooling water, sanitary and bilge pumps, the refrigerating plant, and, in addition to produce electricity for electric lighting, fan driving, winch operating, air compressing, etc. The consumption of oil was measured on the trials and found to be 166 grammes, which equals .366 lb. per indicated h.p. hour.

MARINE NEWS FROM EVERY SOURCE

Forming a Concise Record of What is Being Done and Happening at Home and Abroad, and Providing a Means Whereby Readers are Kept in Intimate Touch with Marine Progress, Development, Etc.

G. T. P. S.S. "Prince George."—The steamer Prince George, of the G. T. P., which is having tanks and oil burning apparatus installed at the B. C. Marine Railway Company's yards at Esquimalt, is ready to resume service, and was scheduled to go out in the place of the Prince Rupert on the northern route on March 3, when the sister steamer will be withdrawn to be converted into an oil burner. The tanks placed in the G. T. P. steamer provide for the carriage of 3,200 barrels of oil.

Fort Nelson. — The hydrographic branch of the marine department is issuing a map embodying the results of a careful survey recently made of the mouth of the Nelson River. The charts show a wide channel from 20 to 60 feet deep in the Nelson River, with few shoals, and these such as could be removed without excessive expense. A passage from one to four miles wide could be secured up the river to a point where railway terminals would be located if Fort Nelson were chosen the port of the Hudson Bay Railway. A protection wall could be built for a roadstead at reasonable expense. This puts a new face on the question of the Hudson Bay terminus, as hitherto it has been understood that Fort Churchill is a superior port. The grades to Fort Nelson are said to be lower and the distance is less.

Kingston, Ont.—The Davis Dry Dock Co. have a large gang of men working on the new freight steamer, which they are constructing for the Ottawa Forwarding Co. The men are now employed in the erection of the steel braces. Mr. John Davis, general manager of the company, is negotiating with an Eastern Ontario firm for the building of a medium sized, shallow draft, steam tug, which will be about 50 feet in length.

Hamilton, Ont.—Word has been received from Montreal that the merger of the Inland and the Richelieu & Ontario Navigation Companies has been completed. Negotiations have been in progress for nine months, and the Canadian Appraisal Company was authorized to place a value on the Inland stock. This company has placed the value at $123, and the shareholders of the Inland Company will receive half that amount in stock and half in cash. Some of the local men interested for large amounts are: Mr. J. P. Steedman, $300,000; Southam, Limited, $220,000; Messrs. W. G. Walton and F. A. Magee, $125,000 each. Other Hamiltonians who are large stockholders are: Messrs. C. S. Wilcox, C. E. Doolittle, F. H. Whitton, John Milne, Cyrus A. Birge, Irving Hobson and Thomas Ramsay. Mr. James Playfair is interested to the extent of $200,000, and Dr. D. L. White, Midland, held $125,000.

Kenora, Ont.—W. H. Earle, of Winnipeg, engineer for the Dominion Department of Public Works, was here recently in connection with the proposed improvements to navigation on the Winnipeg River and at Ash Rapds. The channel, at the first rapids on the Winnipeg River just below the town, will be dredged out to a depth of eight feet, and will be made fifty feet wide. This will remove serious impediment to navigation between Kenora and the Trans-Continental Railway crossing, and should prove a boon to steamship officials, who now will be able to arrange their time tables with assurance.

Ottawa, Ont.—A deputation, which included Mr. Andrew Allan, president of the Shipping Federation; James Thom, vice president; Thomas Robb, manager, and Mr. Davies, of the Levis dry dock, waited on the Minister of Marine and Fisheries recently, and urged that the Levis plant be nationalized. Representations were made that the plant is not now prospering, whereas if it were taken over by the Government and enlarged it could be made into a very valuable ship repairing and salvage plant, able to look after the largest ships taking the St. Lawrence route. The minister was urged to take this action, especially in view of the desirability of saving the Levis works from falling into the hands of the American wrecking trust. It is understood that Hon. Mr. Hazen gave the deputation an encouraging hearing, and will put the question before the Government.

Halifax, N. S.—The fishermen of Lunenberg have started an agitation against steam trawling. A meeting was held recently at which one of the chief speakers was Captain F. G. Robinson, of Boston; Captain Heckman, of Gloucester, was also present. Captain Robinson said the fishing interests of Gloucester would raise $100,000 and perhaps $1,000,000 to put the steam trawlers out of business. He argued that steam trawling reduced the size and number of the fish caught by the ordinary trawlers, and he urged Nova Scotia to prevent steam trawlers entering these waters. Several local men spoke, and then a resolution was passed, asking the Federal Government to prohibit the landing in Canada of fish caught by steam trawlers and that these vessels be refused coal and supplies at Canadian ports. It was resolved to send a delegation to Ottawa, and a committee was appointed to carry on an aggressive agitation.

Niagara Falls, Ont.—Another steamship line will operate between Lewiston and Toronto this season. It will be known as The People's Line. The terminal on the American side will be at Lewiston. Wharfage will also be secured at Niagara-on-the-Lake and Queenston. Two boats will be put in operation this year. H. W. Crawford, of Toronto, who for several years managed the Toronto-Olcott line, will be in charge. One boat has already been purchased, and negotiations have been opened for a second one.

Victoria, B. C.—The increasing trade of Victoria has resulted in the establishment of a new shipping business opened up by Mr. John T. Reid at the Sayward building. Mr. Reid, who has had many years' experience as a ship broker with his brother's firm of Thos. Reid & Co., of Glasgow, has established a ship brokerage establishment for the buying, selling and chartering of vessels of all kinds. While Mr. Reid is personally well known to owners and builders in the United Kingdom, he will be in a first-class position to procure information for prospective purchasers here, who are thinking of buying vessels over there, by working through his brother's firm, as they are closely in touch with every owner and builder in Great Britain, and have particulars of hundreds of vessels on their books. Mr. Reid, who is an intimate friend of the late owner of the turbine steamer Princess Patricia, on voyage to this port, was present at the launching and trial trip of this boat, and also her sister ship the King Edward, and is very enthusiastic about these vessels, which were the first passenger turbine steamers in the world. Having been an ardent yachtsman, he will make a specialty of buying, selling and chartering yachts, as a broker.

Collingwood, Ont.—The Northern

Navigation Co. has announced the following appointments on their steamers for the season of 1912: Steamer Hamonic—Captain R. D. Foote; chief engineer, S. Brisbin; purser, J. F. Ronan, and steward, J. Gardhouse. Steamer Huronic—Captain, A. L. Campbell; chief engineer, F. Norris; purser, F. Burtley, and steward, W. G. Hunter. Steamer Saronic—Captain, A. M. Wright; chief engineer, W. Whipps, and steward, J. H. Morrison. Germanic—Captain, F. Noles; chief engineer, S. Burgess; purser, H. R. Storey; steward, H. Wetherdon. Steamer City of Midland—Captain, M. Livingstone; chief engineer, J. Osburn; purser, Geo. Gillson, and steward, J. L. Gilpin. Steamer Waubic—Captain, W. Carson; chief engineer, S. Murray, and purser, P. Kelly. Steamer Majestic—Captain W. G. Cox; chief engineer, S. Beatty, and purser, J. A. Belcher. Steamer Doric—Captain, Sam Hill. Steamer Ionic—Captain, J. D. Montgomery; chief engineer, J. Louden.

Niagara Navigation Co.—General Manager Folger, of the Niagara Navigation Company, made the folowing appointments for his fleet of steamers for 1912: Cayuga—Capt. C. J. Smith; engineer, George M. Arnold. Chippewa—Capt. Wm. Malcolm; engineer, H. Parker. Corona—Capt. H. W. King; engineer, A. J. Woodward. Chicora—Capt. B. A. Bongard; engineer, J. A. Findlay. Modjeska—Capt. P. Walsh; engineer, O. Flumerfelt. Macassa—Capt. Jas. Henderson; engineer, E. A. Prince. Turbinia—Capt. B. W. Bongard; engineer, Wm. Noonan. Ongiara—Capt. H. J. McIntyre; engineer, H. Hawkins.

The steamers are being thoroughly overhauled, and will be in splendid shape for the opening of navigation.

Quebec.—At a meeting of the council of the Quebec Board of Trade it was decided to request the Hon. L. P. Pelletier, Postmaster-General, to use his good influence with the Government in order to have the steamer Montcalm make another trip to the Gulf. It was also decided to urge upon the Government the necessity of purchasing a larger and more powerful ice-breaker than even the Montcalm has proved to be.

Chatham, N.B. — The dredging plant owned by A. & R. Loggie known as the Eastern Dredging Co. has been sold to Richibucto and St. John parties. The plants consists of two dredges, two powerful tugs and a set of scows for hauling away the dredged material. The price was not made public, but it is known to be in the vicinity of $250,000. Among the members of the new company are Richard O'Leary, Thos. Nagle, W. S. Montgomery, W. F. Humphrey. The transfer was made through John Gleason of St. John.

Toronto, Ont.—Following the amalgamation of the Niagara Navigation Co., the Hamilton Steamboat Co., and the Turbine Steamship Co., the officers have been announced. B. W. Folger is general manager and W. E. Bishop, formerly manager of the Hamilton Steamboat Co., will be Hamilton manager, with P. J. Peer as assistant. J. N. Goodearle, formerly manager of the Turbine Steamship Co. will be general freight agent, with headquarters at Toronto. Arrangements are being made for this season's traffic, and it will be good news to the people of Hamilton to know that the staunch steamer Macassa will ply between that city and Toronto again this season. It was thought last autumn that the Macassa had made her last run between Hamilton and Toronto, but other arrangements have been made and the popular boat will again be on the old route. The captains on the boats have also been appointed. Captain Walsh will be on the Modjeska, and Oscar Flumerfelt will be his chief engineer. Captain Henderson will be in charge of the Macassa, and Captain Bongard of the Turbinia. W. Noonan, who for several years has been chief engineer on the Modjeska, will, this season have a like position on the Turbinia.

Kingston, Ont.—Francis King, counsel for the Dominion Marine Association, has received the following telegram from the Secretary of Commerce and Labor at Washington:—"Attorney-general holds coastwise passenger law applies to transportation beginning at one port in the United States and ending at another, and not to transportation beginning and ending at the same port." This confirms the construction of the law contended for by Canadian owners last summer when the decision in the Turbinia case and the instructions then issued to the United States collectors of customs threatened to disorganize international traffic all along the boundary. The Canadian owners asked for a reversal of the Turbinia ruling, and recently at the request of the Department of Commerce and Labor, Mr. King submitted the case for the Canadian owners to the consideration of the Attorney-General of the United States, and the above telegram followed.

Halifax, N.S.—Short of coal, the Norwegian steamer, Frutera, nearly eighteen days out from Hamburg, arrived here recently. The Frutera was loaded with 1,450 tons of kainet salt and bound to Savannah, Ga. Her passage across the Atlantic was beset with heavy seas and high winds. Heavy ice was also met, and seas, which at times ran mountains high, lifted large cakes of ice on the deck of the steamer menacing the lives of the crew. Two of the life boats were ripped from their fastenings and dashed against the sides of the steamer and smashed to pieces. Captain Danielsen said he had quite a rough time. After leaving Hamburg a call was made at Newcastle-on-Tyne for bunker coal, which port was left on February 9. The captain said the first heavy ice was met when about 250 miles east of Newfoundland, but the steamer got into clear water again. Ice was next encountered when 40 miles northeast of Sable Island. It was the intention of Captain Danielsen to put into Louisburg to replenish the coal bunkers, but the entrance to that port being blocked by a heavy field of ice, Captain Danielsen decided to run into Halifax. From Halifax the Frutera proceeded to

Vancouver, B.C. — In the last fiscal year, according to customs figures, 1,327 vessels, aggregating 1,509,445 tons, entered the port of Vancouver. Montreal had 431 vessels of 1,661,370 tons. Quebec had a total of 372 vessels, but led in tonnage—1,851,730.

Kingston, Ont. — One of the busiest places on the labor front these days is the yards of the Kingston Shipbuilding Co., where 200 men are employed. Two government boats are under construction, and the steamer Port Colborne is in dry dock, where extensive repairs are being made to her bottom, which she scraped at Lachine in the fall. At Garden Island, the Calvin fleet is undergoing the usual repairs, as well as extensive alterations to two of the fleet. The tug Johnson, which has done valuable service for years, is being repaired, and the steamer Simla, originally a two-deck boat, is also in the hands of workmen. The upper deck of the latter is being removed, which will put her in a better condition to handle cargoes of logs and other freight.

Australian-Canadian Liner. — The new steamer which is being built at Clydebank for the service of the Union Steamship Co. of New Zealand, between Auckland and Vancouver, will have several interesting features. The machinery will consist of two reciprocating engines driving twin screws and a turbine driving a single screw. There will be ten boilers, in six of which steam will be raised by means of coal, and in the others by oil fuel. The bunkers are all being so constructed that oil can be carried if desired. The vessel will have a speed of 17 knots, and will be the largest registered in Australia. The contract, which was placed in August of last year, provides for a ship of 10,000 tons gross, with accommodation for 700 passengers and 7,000 tons of cargo. She is to be delivered about the end of this year.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals who Have Been More or Less Prominent in the Marine Sphere

Personal

Capt. J. A. Montgomery has been appointed master of the D. G. tug Hercules.

* * *

Capt. J. N. Foote has been re-appointed master of the steamer Turret Crown.

* * *

Mr. Charles Noble, manager of the United States & Dominion Transportation Co., with headquarters at Owen Sound, died in Collingwood recently.

* * *

Mr. John McCannell, mate of the C. P. R. steamer Keewatin, left on a trip to the Pacific Coast. He expects to be away about two months.

* * *

Mr. H. Beaton, son of William Beaton, of Owen Sound, has been appointed purser on the D. & C. steamer City of Detroit. He held a similar position on the City of Cleveland last year.

* * *

Mr. J. M. Smith, manager of the Collingwood Shipbuilding Co., has been to Ottawa, with a view to securing the contracts for one or both of the two new cruisers to be constructed for the Dominion Government.

* * *

W. P. Anderson, chief engineer for the Marine and Fisheries Department, was in North Bay recently in connection with the subject of lighting the government wharf for the guidance of vessels, and also to facilitate loading freight at night.

* * *

Mr. James Buckley, 73 Royal Trust Building, Montreal, will represent Messrs. Rudd & Owen's specialties in Canada; a prominent line of which is asphaltic solution for protection of iron and steel. This product has found a large and ready market among steamship, dock, transportation, colliery and manufacturing concerns in Great Britain nad the Continent of Europe.

* * *

Mr. E. V. Collier, who was for a number of years attached to the Government marine engineering staff at Ottawa, has been appointed Canadian representative, with offices at 624 Coristine Building, Montreal, for James Howden & Co., Glasgow, the well-known forced draught engineers and specialists. He will also represent the Wallsend-Howden system of oil fuel burning.

* * *

Fred. W. Doty, Sr., president of the Doty Engine Works, Ltd., is dead. His death occurred at Goderich, Ont., on February 26th. He is survived by four sons and one daughter.

* * *

P. R. Warren, engineer in charge of Messrs. Norton Griffiths Company's contract in Eastern Canada, was in St. John last week making a final report on the location of the dry dock which is to be built by his company in connection with the Courtenay Bay contract. According to Mr. Warren, operations will be under way by the end of March.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.

President— F. Plummer, Toronto; **Counsel**—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.

Chairman—E. E. Horsey, Kingston, Ont.
Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.

President—W. M. Lowrie, New York.
Secretary—M. R. Nelson, New York. .. ....

THE SHIPPING FEDERATION OF CANADA

President—A. A. Allan, Montreal; **Manager and Secretary**—T. Robb, 526 Board of Trade, Montreal.

SHIP MASTERS' ASSOCIATION OF CANADA.

Grand Master—Capt. J. H. McMaugh, Toronto, Ont.; **Grand Secretary-Treasurer**—Capt. H. O. Jackson, 376 Huron St., Toronto.

GRAND COUNCIL, N.A.M.E. GRAND OFFICERS.

James T. McKee, 268 Douglas Avenue, St. John, N.B., Grand President.

Thos. Theriault, Levis, P.Q., Grand Vice-President.

Neil J. Morrison, P.O. Box 238, St. John, N.B., Grand Secretary-Treasurer.

Jno. A. Murphy, Midland, Ont., Grand Conductor.

George Bourret, Sorel, P. Q., Grand Doorkeeper.

Richard McLaren, Owen Sound, Ont.
L. B. Cronk, Windsor, Ont.
Grand Auditors.

MARINE SERVICE GUILD.

The captains and masters of British Columbia have joined hands and decided that in the future they must be given fair play in every case, and must not be subjected to unjust comments and decisions.

Many seamen gathered in the office of James & Jarvis, Government street, recently, at the call of Mr. Jarvis, and agreed that the Marine Service Guild of British Columbia be formed. Others who were unable to attend on account of being out of port, sent letters stating their views and promising to abide by whatever action the meeting took.

Every master and officer of the Grand Trunk Pacific steamers stated that they were in favor of the formation of the guild and most of those in the employ of the C. P. R. were agreed that the organization would be of the greatest benefit to the seafaring community. Masters and members of the old companies operating steamers and tug-boats wrote to announce that they also were in favor of it. The membership of the society already totals over fifty.

It was decided at the meeting that only those in active service would be accepted as members of the guild. The fee for captains was fixed at $25, and for officers, $15. Offices of the organization are to be opened in Vancouver, and application forms are to be sent to every British officer who is engaged in active service in the province.

One great advantage of the guild, it is said, will be that whenever a master or officer is in danger of losing his certificate through a casualty to his ship, and is called to appear before the marine court, an attorney will be engaged to watch the case in the interests of accused.

SUB-COUNCIL OFFICERS.

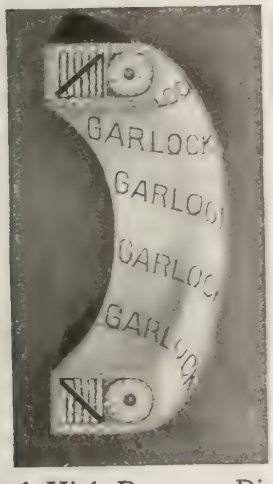
Name	No.	President.	Address.	Secretary.	Address.
Toronto	1	J. W. Aston	93 Cowan Ave.	E. A. Prince	61 Elm Grove Ave., Toronto.
St. John	2	Jas. T. McKee	268 Douglas Ave.	G. T. G. Blewett	65 Harrison St., St. John, N.B.
Collingwood	3	Jas. McRoberts	Collingwood	Robert McQuade	Collingwood, Ont.
Kingston	4	George Flemming	3 Brewery Lane	James Gillie	97 Clergy St., Kingston, Ont.
Montreal	5	A. F. Hamelin	3208 Le Tang Street	Dominique Leclaire	Lachine Locks, Montreal, P.Q.
Victoria	6	Alex McNivern	Five Sisters Block	Peter Gordon	808 Blanchard St., Victoria, B.C.
Vancouver	7	A. S. DeGruchy	2200 Granville St.	E. Read	Victoria Court, Vancouver, B.C.
Levis	8	Michael Latulippe	Lauzon	Jules Lecours	Bienville, Levis, P.Q.
Sorel	9	Wm. Steadwoothy	Sorel	Al. Charbonneau	Sorel, P.Q.
Owen Sound	10	Russel R. Foote	Box 657	E. J. Riley	1030 1st Ave., Owen Sound, Ont.
Windsor	11	Alex McDonald .	28 Crawford Ave.	Neil Maitland	221 London St. W., Windsor, Ont.
Midland	12	Arthur Abby	Midland	Jno. A. Murphy	Midland, Ont.
Halifax	13	D. J. Murray	Victoria Rd., Dartmouth	Chas. E. Pearce	Dartmouth, Halifax Co., N.S.
Sault S Marie	14	Thos. O'Reilly	Sault Ste. Marie	Geo. S. Biggar	Sault Ste. Marie, Ont.
Charlottet'n	15	Chas. Cuming	Charlottetown, P.E.I.	Lem Winchester	32 Fitzgerald St., Charlottet'n, P.E.I.

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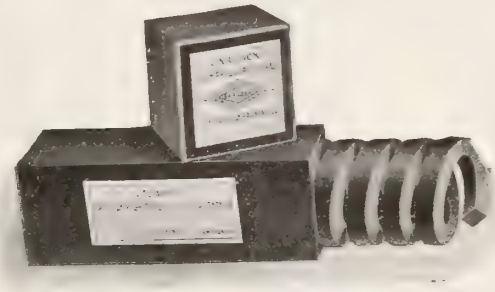
The Garlock Packing Co.

Hamilton

▣

BRANCHES

Montreal Toronto
Winnipeg
Vancouver



Garlock High Pressure Spiral



Garlock Low Pressure Diagonal



Garlock Gum Gore

London, Eng. — The Allan Line announces that it will inaugurate a steamship service between Plymouth and Canada early in April. The first steamer to call will be the Sicilian, on April 19. After May 17 there will be a fortnightly service to Quebec and Montreal.

Messrs. John Reid & Co., Glasgow, are having built by George Brown & Co., Greenock, for a Canadian client, a 55 ft. steel tug. The vessel is 14 ft. 6 in. beam by 7 ft. 6 in. moulded depth, and will, we understand, be fitted with a semi-Diesel engine of about 120 b.h.p. An interesting part of the installation will be a reducing gear, which will bring down the revolutions of the propeller to about 120. All engine controls will be led by rod and pinion wheel to a small wheel-house arranged forward of 'midships.

London, Eng.—The announcement from Montreal that a company, supported by a powerful group of British capitalists and Canadian railroad men, had been formed to operate a line of fast day boats between Great Britain and Halifax, was received here with patriotic joy. The London Times confirms the report that six 24-knot vessels will be built for the purpose of sending western American and Asiatic traffic via Canada instead of via the United States. It is expected the vessels will be subsidized by the Government and will be armed for self-defence and for defence of Atlantic trade routes in time of war.

The Largest Atlantic Coast Drydock.—The completion of drydock No. 4 at the Brooklyn Navy Yard marks the conclusion of an engineering work of unusual perplexity and difficulty. More than one contractor abondoned the work in utter discouragement or through financial inability. Failure was due mainly to the fact that the site of the dock included a large bed of quick-sand, which moved in upon the excavation and rendered it necessary to devise an altogether novel method of construction. Accordingly, a continuous retaining wall of concrete was sunk around the site, massive piers of concrete were put through to the solid bottom, and the dock was built within and upon these structures as thus prepared.

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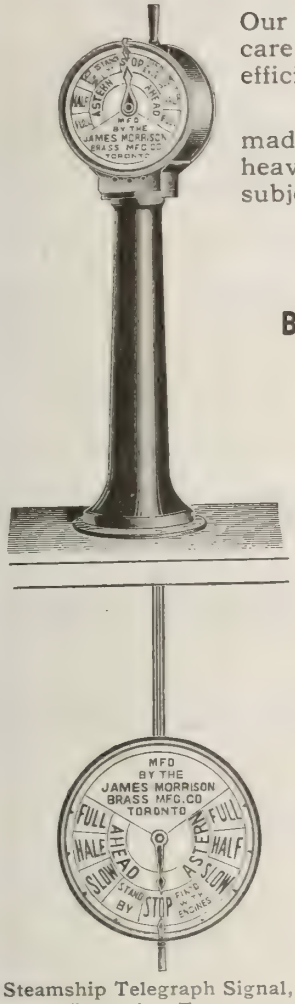
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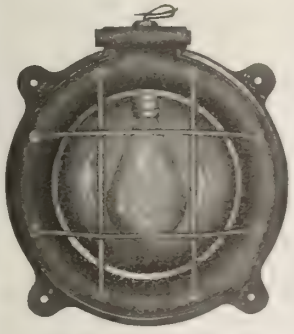
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L. VIGOUREUX, Manager.

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Electric Deck Light, Heavy Type.

Our products in this line are made with the best of care and attention to insure perfect construction and efficiency.

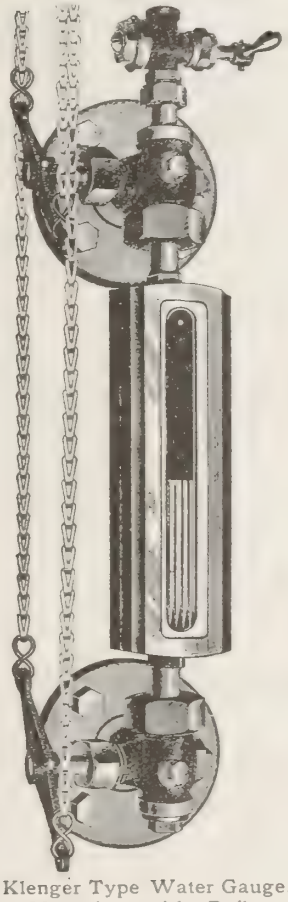
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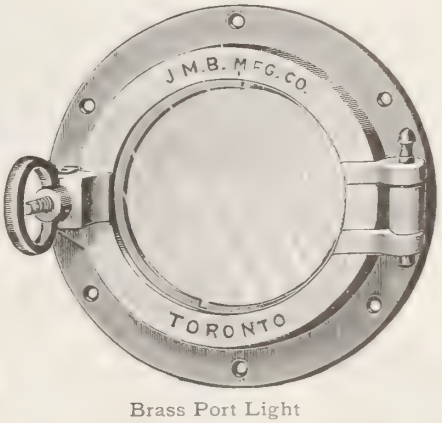


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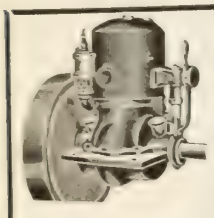
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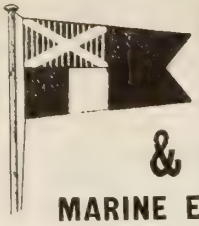
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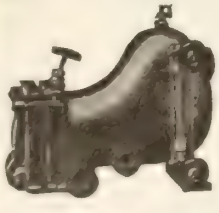
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Specialists in
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FOR SALE
Three Scotch Marine Boilers
300 HORSE POWER
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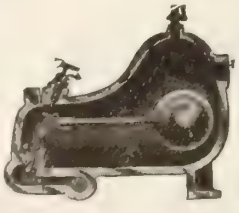
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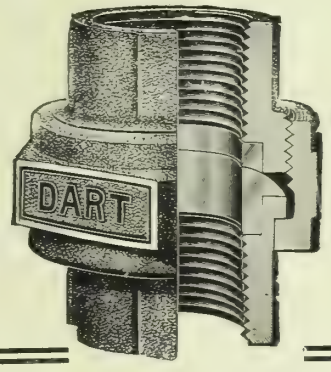
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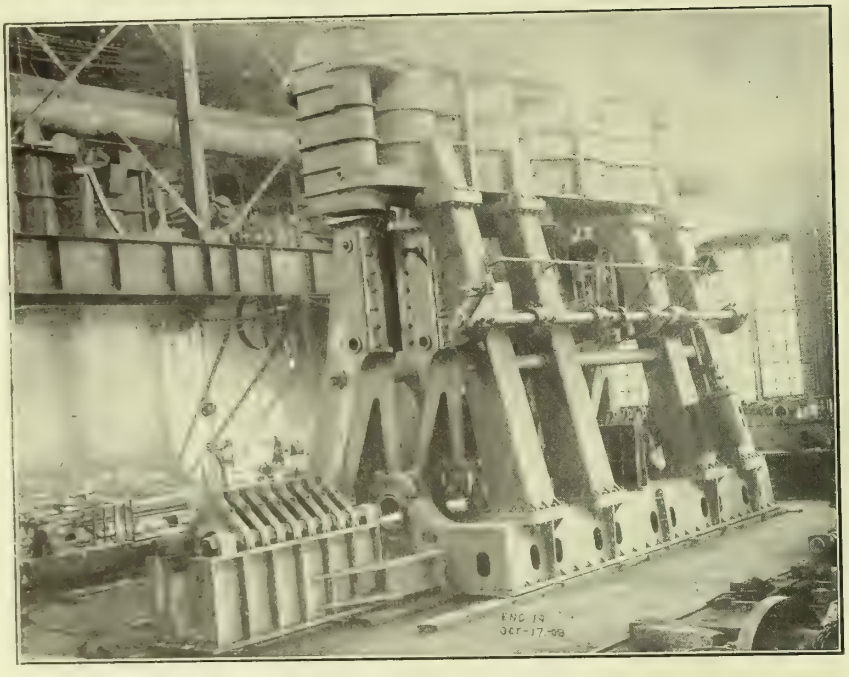
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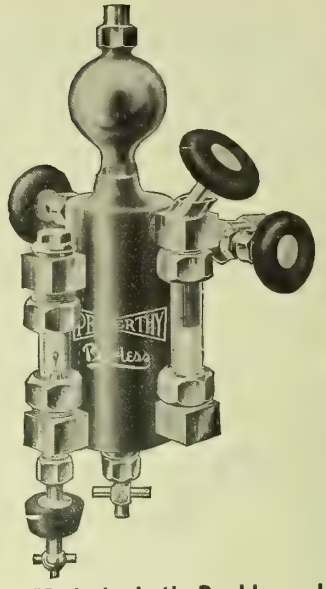
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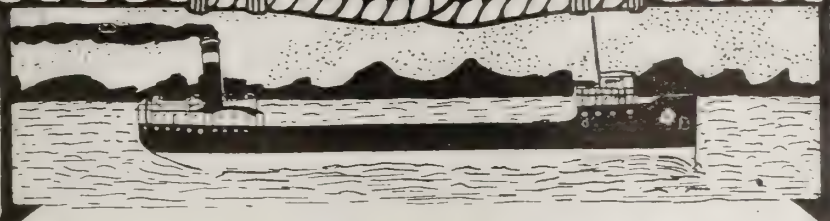
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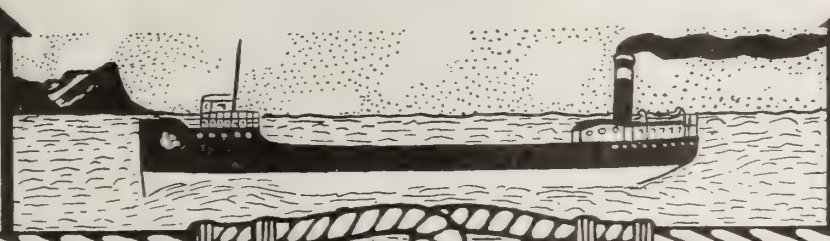
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A monthly journal dealing with the progress and development of Merchant and Naval Marine Engineering, Shipbuilding, the building of Harbors and Docks, and containing a record of the latest and best practice throughout the Sea-going World.

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Vol. II APRIL, 1912 No. 4

MARINE ENGINEERING OF CANADA.

OUR subscribers aboardship during the coming season would confer a favor on us and ensure to themselves regular delivery of this journal by advising our circulation department of port addresses to which to mail the various numbers.

Details of happenings and experiences, accompanied by sketches or photographs where these are applicable, will be appreciated for publication in our editorial columns, and be paid for at usual rates. Flowery language, choice grammatical expression and fluent composition should be secondary considerations in deciding you to contribute. Many opportunities will present themselves for profitable pastime of this nature, and besides being beneficial to yourself, the contributions will be helpful and instructive to others.

BON VOYAGE, SEASON 1912.

AS we go to press with this issue, there is evidence on every hand of active preparation for a bright and prosperous season ahead for the myriad marine and allied commercial interests of our Dominion. Our ocean ports will as usual have their quota of new merchandise and passenger vessels, and our inland waters will, in keeping with the continually increasing demand, show correspondingly up-to-date fleet additions. Marine surveyors are pursuing their calling of inspection and certification of all manner of craft, with a view to securing maximum immunity from danger, loss and calamity to crews, passengers and owners, while those responsible for the comfort, decoration and equipment of the various carriers are hastening the finishing touches on these.

That there will be sunshine and shade during the coming season in the experience of some percentage of those who take to the sea or lake for material profit or pleasure, we may with safety prophesy; yet withal, the chances are no greater, if as great, in the matter of disaster, than those we daily take on a city's streets. Marine Engineering of Canada extends to one and all embraced within the scope of its operative interests, hearty good wishes for pleasant, profitable and Providence protected voyages, and gives expression to the hope that none may be amissing at the "tie-up" when winter quarters are again in order.

LATE OPENING OF NAVIGATION.

THE severe and long drawn-out winter—the close of which is apparently in sight, has again, and perhaps more forcibly than aforetime, directed attention to the question of attempting to not only shorten Nature's close season of navigation with the aid of icebreakers at the tail end, but in addition, adopt such methods as may be practicable to delay its close.

That there has been much apathy shown in the past towards a solution of the problems involved, we are all more or less aware, and that much may be said in favor of the attitude adopted is a truism. It may be said, however, that the attempts to keep the St. Lawrence open between Montreal and the sea, or to accelerate the opening by means of icebreakers has been to a large extent a freak performance, as aimless as it has been useless. There has been absent entirely that resoluteness and fixity of purpose to achieve something beyond the commonplace. The results have in no way been such as to impress even shipping men, much less underwriters, and just so long as the performance of icebreaking is judged by its spectacular fitness for picture post cards, then just to an equal extent will its commercial utility be measured. Our icebreakers have a nasty habit of being more or less self-destructive at critical periods, such as the transition from winter to spring, and of necessity have to leave to old King Sol what is after all the beginning, continuation and end of the whole job.

The prospects for an exceedingly late opening of navigation are of the brightest and most convincing kind, not only on our inland waterways, but from our metropolis to the sea. Does it not then behoove those whose interests are directly affected to face the problem fairly and squarely, with at least the determination, backed by 20th century scientific knowledge and engineering ingenuity, to at least accelerate the work of nature in releasing our lakes and rivers from the grip of King Frost? It is more than probable that the effort to combat successfully the onslaught of a good old-fashioned, or for that part, a real modern Canadian winter, would be a more or less quixotic performance, and after all of little material benefit, therefore, something less sweeping is more likely to be successful. The proposal to form a Canadian Lloyds has at least this feature about it, that its co-operation from a self-protective and patriotic standpoint would be a powerful factor in curtailing navigation's close season. We can afford to wait the development, perfection and reliability of the airship, but we need not delay accepting the icebreaker-ship which has long since passed the experimental stage. This ice-breaking project should be treated in a businesslike way, and with equipment befitting the work. A pleasure motor car is somewhat distinct from a brewer's or miller's heavy delivery motor waggon, and a cross between them is just as unsuitable for the work of either. In like manner the individual units forming a fleet of icebreakers, whether on the St. Lawrence or on inland lakes, should be first and always what their name implies, if benefits are to accrue, and secondarily and of less importance for other service accomplishment.

The Plant of Harland & Wolfe, Queen's Island, Belfast

By Lagan

This firm's world-wide reputation and achievements in shipbuilding and marine engineering are known and discussed by men in every section and department of the profession; therefore, the accompanying brief description of the plant and equipment, wherewith the superlative degree of performance has been attained, should contribute to the instruction and education of all classes of our readers.

COMPARATIVELY speaking, the firm of Harland & Wolff, is not an old one; but the fact that it has, within a period of little over half a century, risen from being an insignificant establishment covering but a few acres and employing a couple of hundred men, to the position of the finest shipbuilding and engineering works in the world, marks its progress as nothing less than phenomenal. The ground now occupied is upwards of 120 acres, while between 14,000 and 15,000 hands are employed.

Firm's Birth and Achievements.

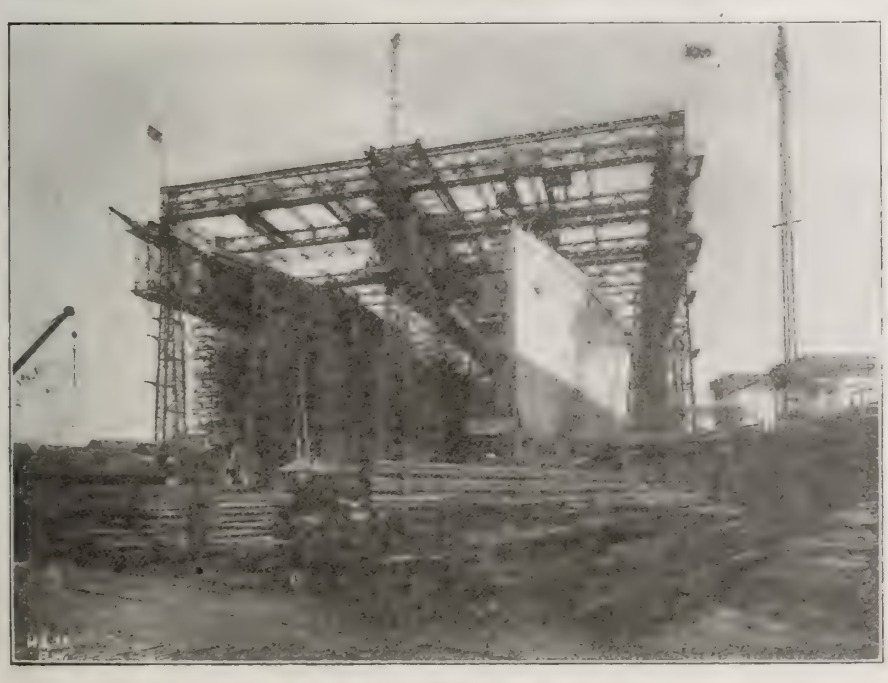
In the year 1858, Mr. Harland (afterwards Sir E. J. Harland, Bart.) took over the works of Hickson & Co.; four years later admitting as a partner Mr. G. W. Wolff. In 1874 Mr. Pirrie (now the Right Hon. Lord Pirrie, K. P.) was also taken into partnership, and through the latter's remarkable foresight and enterprise, the firm has attained its present position of pre-eminence in the shipbuilding world.

Harland & Wolff first began to make history in shipbuilding by the construction of the early Bibby liners, which were a complete departure in the matter of proportions from previous practice; some of these vessels being 10-11 beams to length. A few years later began their connection with the White Star Company, the building of the first Oceanic, pioneer steamer of that line, marking another innovation: the vessel being



Floating Crane.

the first in the Atlantic trade to have passenger accommodation amidships. Since then, they have rarely for any great length of time been without a White Star boat on the stocks. Amongst many notable vessels built by them for this company may be mentioned the Teutonic and Majestic—the great fliers of their day. Following them, came the leviathans, Oceanic (the second), Celtic, Cedric, Baltic and Adriatic; which, in turn, have been easily surpassed by the 46,000-tonners, Olympic and Titanic. These, again, are to be eclipsed in point of size by a steamer presently building at Queen's Island, for Ismay, Irmie & Co. Among other well-known shipping concerns for whom Harland & Wolff have built many vessels may be mentioned the Bibby, Leyland, Union-Castle, P. & O., and Royal Mail Lines; also the Hamburg-American Co., and the Holland-America Co.



Olympic and Titanic on the Stocks.

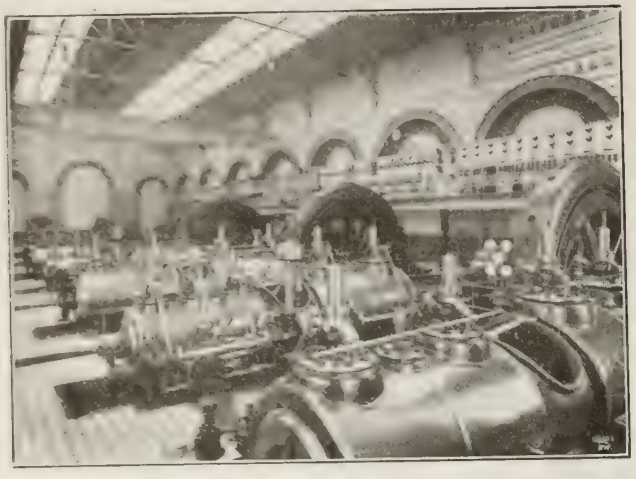
Large Tonnage Vessels a Feature.

Lord Pirrie has always been a strong advocate of the big ship, and the large number of leviathans put in the water from the Queen's Island stocks affords striking evidence of shipowners' concurrence in his views on naval architecture. Within the past twenty years or so, close on 60 of the vessels launched there, have been over 10,000 gross tonnage each. Of these a considerable number exceed 15,000 and 8 have a gross tonnage of over 20,000 each; two—the Olympic and Titanic—being vessels of 46,000 tons gross. The firm holds the record output for 1911, a distinction attained also in previous years. A shipbuilding company occupying such a position must, therefore, necessarily have extensive premises equipped with the most up-to-date machinery for expeditious and economical production, and in this respect, the Queen's Island shipyards and engineering works are unsurpassed. To gain an adequate appreciation of the magnitude of the operations carried out, a visit to the works is essential, and in the course of such an inspection one cannot fail to be impressed with the evident fact that in Lord Pirrie's opinion nothing but the very best of everything is good enough.

Yard Equipment.

At the south end of the yard two of the slips are served by a double-armed cantilever crane travelling on a high gantry which extends between, and the whole length of these ways; while at the north end there are the huge gantries under which the Olympic and her sister-ship Titanic were constructed. On

these are numerous electric traveling cranes for light and heavy lifts, capable of lifting and depositing material over the entire area of the two slips. The aggregate brake h.p. of the motors used for driving the cranes, riveting plant, etc., carried on these gantries is over 1,400. Then, there is the monster floating crane which is used for lifting engines and boilers on board. This crane was tested to a load of 200 tons.



Electric Power Station.



A bay of the machine shop.

Turning now to the shops, in the platers' sheds we find here the same evidence of up-to-dateness; the tools—plate bending rolls, punching and shearing machines, etc.—being of the very latest types, and all driven by electricity generated in a central station which for size and contents is hard to surpass anywhere. In the various other departments we find the same principles of perfect equipment and organization carried out. The buildings are all extensive, lofty, well lighted, and replete throughout with the latest products of the brains of those whose attention is given to the labor-saving problem.

Erecting and Heavy Machine Shop.

The total length of the recently built erecting and heavy machine shop is 750 feet, the total breadth is 89 feet and the total height is 77 feet 6 inches. The design, generally, provides for a construction in which rigidity and stiffness, as well as strength, have been given careful consideration. The roof is entirely covered with glass except for the ventilator hood; the glazing being of rough cast plate 1-4 inch thick, laid in putty, and so arranged as to give the maximum amount of light possible. Large windows are fitted along one side and smaller ones at the top near the roof. One end, opening on Queen's Road is built of iron.

A gangway has been fitted inside the shop to give access to the crane girders, and another one outside gives access to the roof, both being protected by hand railing. Three overhead electric traveling cranes are provided, two of them capable of lifting together 200 tons and the third 25 tons. The floor is laid with Jarrah wood blocks, supplied and laid down by the Acme Flooring & Wood Paving Co. on a foundation of 9 inches of concrete.

A line of rails connects with the Harbor Tramway in Queen's Road, to a heavy turntable near the centre of the shop, which in turn connects with the iron foundry. Irish Standard gauge rails at the upper end of the shop communicate with the brass foundry. Narrow gauge tramways communicate with all shops.

Machine Tool Features.

The following is a short description of the larger and most important machine tools which have been installed:—

One universal double horizontal boring, drilling, tapping, studding and milling machine by Thos. Shanks & Co.

The slide bed of this machine is strongly constructed and is 26 ft. long by 5 ft. broad. Mounted on the slide bed are two strong box section vertical columns which slide along the bed both by hand and power, the power movement being through an independent motion shaft, driven by an auxiliary motor of 12 B. H. P. The columns, which have a horizontal traverse, give a maximum range of 20 ft. between centres of spindles. The spindle, which is carried on a slide mounted on the vertical columns, has a vertical range of 13 ft. The main drive is from two separate and independent variable speed, shunt-wound, 18 h.p. motors—one mounted on each column and sliding along the bed with it, connected with the necessary gear so that no long driving shafts are in the bed, while the drive over each spindle is entirely free and independent of the other, both for speed and direction. The spindles are 4 3-4 inches diameter, with a traverse of 36 inches. The work table which is bolted to the sliding bed is 20 ft. by 10 ft.

One heavy, quadruple geared, double bed, turbine lathe by Shanks & Co., for turning turbine rotors.

This has a double sliding bed of great



Harland & Wolff Shipyards, Belfast.

width and depth and of special section to resist strains. The fast headstock of massive design has a forged steel spindle with large diameter in the front journal, also thrust rings for end pressure. The



LORD PIRRIE.

arrangement of gearing is Shank's latest improved plans with quadruple and double purchase driven by a direct connected, shunt wound, variable speed 60 b.h.p. motor. This new drive is of the simplest character, ensures silent running and reduces torsion through the shafts, at a minimum expenditure of power. The saddles are 4 in number, specially constructed for heavy strains, and have independent power traverse either way through the racks. This lathe is 100 inches centres, will admit 50 feet between same and will swing over the saddle 14 ft. 11 inches, and over the shears 16 ft. 9 inches. The gross weight is about 174 tons.

One vertical and horizontal planing machine for machining turbine casings, engine bedplates and large general work of all kinds:—

The foundation bed is of very strong design. The work table, a small part of which is cast in the foundation bed, has its main portion securely checked into the foundation bed, and firmly secured there with bolts. The vertical bed is in two castings of specially strong and rigid design. The travelling standard is of large box section strongly ribbed and capable of withstanding heavy cuts without spring. The machine is driven by a 30 h.p. motor direct-connected to the machine by the necessary gear. A platform is fitted to the traveling standard and also to the saddle thereon, so that the attendant may constantly follow the surface being machined.

One patent steam turbine casing boring machine:—

This consists of three parts:—(a) the machine proper; (b) two heavy double stays; and (c) baseplate for supporting the work. The machine includes a wide slide bed with two driving shafts, and in the middle a guide screw; while on the outside it is provided with a planed tee groove for facilitating the setting of the column when grooving. A strong box section column slides upon this bed, with quick power reversing speed, and two independent systems of variable feed. The headstock saddle is balanced and has power vertical adjustment to obtain the exact height from work plate required. The drive is from a 40 b.h.p., shunt-wound, variable speed motor, 300 to 900 r.p.m. The motor is placed at the end of the bed and connected to the driving shafts in the slide bed by the necessary cut wheels; giving 40 speeds through worm wheel slow drive, and 40 speeds through the bevel gear quick drive. These are so arranged that the one drive must be clear and disengaged before the other can be engaged. Two heavy double stays are fitted for carrying the boring bar. The baseplate for supporting the work and the boring stays consists of four castings planed on the joints, securely checked and bolted together. The principal dimensions of this machine are:—width of slide bed, 8 ft. 6 inches; traverse of column, 9 ft. 6 inches; largest diameter to bore, 17 ft.; maximum height work plate to centre of spindle, 9 ft. 6 inches; diameter of worm wheel, 8 ft; and size of baseplate, 45 ft. 10 inches by 16 ft. This machine is also by Messrs. Shanks.

One vertical cylinder boring machine with 16 inches diameter boring bar, cap-



A portion of the boiler shop.



New addition to machine and erecting shops.

able of boring cylinders 112 inches diameter by 75 inches stroke.

One vertical cylinder boring machine with 15 and 11 inch boring bars, capable of boring cylinders 80 inches diameter by 60 inches stroke.

Two surface tables, each 20 ft. x 15 ft. x 18 inches deep, are placed 3 ft. apart, so that they can be used either singly, or if required for larger castings or shafts, the two tables can be used together.

A large bed has been made for erecting engines. It is 136 ft long x 50 ft. wide over all, and has nine rows of concrete blocks, 2 ft. square; the whole length of the bed being supported by 176 pitch pine piles 13 inches square by 30 ft. long. On this bed five or six sets of marine engines can be erected simultaneously, according to their sizes.

Management Features.

Throughout the entire establishment—shipyard and engine works—it may be said that a weeding-out is in constant process; Lord Pirrie's dictum in this respect being to the effect that as soon as an improved type of any class of machine is brought out, the old tool must go. The finest works in the world, however, in any business, will not make for economical and efficient production if proper management is lacking. Harland & Wolff's operations are conducted by an efficient staff working under capable management, and above all, there is Lord Pirrie's guiding hand for, although he has many business interests outside the great shipyard, the bulk of his energies are directed towards the affairs of this establishment. Just here, we can put our finger on the keynote of the firm's success—it is, that the spirit of Lord Pirrie's wonderful personality pervades the entire plant. There is not a man in the works, even in the humblest position, who is not justly proud of the firm's high standing in the shipbuilding world, and it seems to be the earnest desire of everybody to contribute his own little bit towards maintaining it.

Allied Accessory Equipment.

Harland & Wolff have from time to time added various allied branches of the shipbuliding and engineering industries to their works. They have had from the first their own iron and brass foundries; while some years ago they built a fine coppersmiths' shop, and [illegible] up electrical engineering for the fitting-out of their [illegible] installations. Now they are about to commence the [illegible], which have hitherto been supplied from firms who make a specialty of this class of work. They have for many years [illegible] machinery, compound [illegible] manufactured and applied by their own staff.

Marine Engine Development.

As already indicated, Harland & Wolff have been directly responsible for many improvements and innovations in shipbuilding practice, but it is not in this respect alone that they have shown the way. They have been closely identified with the evolution of the marine steam engine, and may be said to have brought to a state of perfection the quadruple-expansion "balanced" engine. In 1908 they introduced in the case of the White Star liner "Laurentic," the combination of two sets of reciprocating engines and a low-pressure turbine; the latter driving the central, and the former the two wing propellers. So marked was the success of this system that it was decided to adopt it in the "Olympic" and "Titanic." The Aberdeen liner "Demosthenes," built at Queen's Island last year, was provided with this system of propulsion, as is also the Royal Mail Steam Packet Company's mail and passenger steamer "Arlanza," at present fitting out.

British Admiralty Work

Although Harland & Wolff are essentially big liner builders, they have also done a considerable amount of admiralty work. In early days, they built the gunboats Lynx, Algerine, Lizard, and Bramble, also the torpedo depot ship Hecla. In 1887 they engined the cruisers Rupert and Racoon, and between 1896 and the present they have constructed the machinery of H. M. 1st class battleships Hannibal, Queen, King Edward, Hibernia, and Neptune, and H. M. 1st class cruiser Minotaur. They have also carried out the overhauling and refitting of H. M. S. Hermes, Melampus and Endymion.

Many big ship repairing contracts have from time to time been carried out at the Queen's Island works and at the firm's repairing establishment in Southampton, including the lengthening of a number of notable vessels; the building of a new fore end for the White Star liner Suevic. This was constructed at Belfast and afterwards towards towed to Southampton where it was riveted up to the after portion of the vessel in dock there.

General.

Before passing from the outline description of the works, reference should have been made to the extensive timber yards in which they carry enormous stocks of timber of every class used in shipbuilding. As regards internal fittings, not one square foot of artificially seasoned wood is used, the result being that one does not find gaping seams or warped panels after a vessel has been at sea a voyage or two.

Regarding workmanship, the very best is put into every detail of the ship and her machinery. "Scamping" is a word unknown in the Queen's Island vocabulary, for no matter what the contract price may be, Harland & Wolff spare no effort to turn out a first-class job, and in this feature they meet with the highest success.

Vessel Contracts Awarded

The Collingwood Shipbuilding Co. has just secured from the Keystone Transportation Co. of Montreal a contract for the construction of a new lake and canal steamer. It is stated that this is the first time a Canadian shipbuilding firm has been able to beat out British shipbuilders in speed of delivery and cost. The British prices were high, and they could not guarantee delivery until the spring of 1913, while the Collingwood people promise delivery next September. This will enable the new boat to get a share of the valuable Fall wheat traffic. High prices of labor and supplies in England, coupled with dislocation of trade caused by the coal strike, as well as congestion of work in the British shipyards were contributory to the changed order of things.

Should the new vessel be delivered by September it will constitute a record for Canadian shipbuilding. She will be employed in the grain and coal carrying trade between Lake Erie and Montreal. Her dimensions will be 258 feet long, 42.6 feet beam, 20 feet depth, 800 horsepower engines, and speed ten miles an hour. 2,400 short tons, or 80,000 bushels of wheat will be the deadweight capacity and the approximate cost $140,000.

* * *

The Northern Navigation Company has placed an order with the American Shipbuilding Company for the building of a large steel passenger steamer on the same lines as the Hamonic. The vessel will be of steel, 385 feet long, 52 feet beam and 28.75 feet depth. She will be fitted with a four-cylinder triple expansion engine, steam being furnished by four Scotch type boilers. The boat will be built in the yards of the Western Drydock and Shipbuilding Company at Port Arthur. She will cost about $750,000, and it is planned to have the launching take place in June, 1913.

COROZAL'S ARRIVAL.

The twin screw ladder dredge Corozal arrived at Balboa at 10 o'clock on Wednesday morning, March 27, and at once prepared for its work of under water excavation in the Pacific entrance of the Canal. The Corozal left Falmouth, England, on December 29th, and was thus 88 days in making the voyage of approximately 12,000 miles by way of the Strait of Magellan.



CANNERY TENDERS AND FISHING CRAFT.

By George Bulkeley.

THE fisheries of British Columbia are her premier industry. In no other direction of the province's resources are there signs of so much increased prosperity as evidenced by the number of new firms and the amount of new British, Canadian and American capital entering the field. Amongst others, Sir George Doughty, the head of the great fishing interests of Grimsby and other ports on the North Sea, has now established at Skidegate, Queen Charlotte Islands, B. C., the beginnings of a large fishing industry. This concern, which is styled the B. C. Fisheries, Limited, is under the management of Mr. W. V. Doughty, and bids fair to develop into an immense business, as the firm is preparing to exploit in a most thorough manner all the multitudinous fields and bypaths of the fishing trade. Touching sources of revenue derivable from the catching of fish in large numbers there may be mentioned the extracting of fish oil from certain breeds, and the working up of the residual offal into fertilizer. Another byproduct of the process is the refining of fish glue, a business which is now attracting considerable attention from fishing interests in British Columbia. Again, besides the time honored salmon canning industry of this Pacific Coast, the catching of halibut in the northern waters of the province, and the exporting of this fine fish in cold storage show increasing interest being taken towards further developments. All of the foregoing means large orders for cannery tenders and seagoing fishing craft.

Engine Equipment.

These cannery tenders and seagoing fishing vessels, all of which are now propelled by internal combustion engines (some few having auxiliary sails) constitute a distinct and separate branch of naval architecture and shipbuilding, which is only to be met with in such large fishing centres as the Pacific and Atlantic Coasts of Canada. These craft, from 40 to 80 feet overall length, have to weather every kind of sea, make long open sea trips from cannery to cannery, stay out for long periods on the fishing grounds, and carry anything and everything in the way of mail, fish, freight and passengers. It follows, therefore, that they have got to be of very seaworthy design and staunch construction, and that they shall be equipped with absolutely reliable and efficient engines; so that there may be no delays in their important work, nor possible loss of the vessels owing to a breakdown of their motive power.

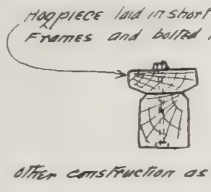


Fig. 2.

This Pacific Coast produces some of the most reliable and all-round efficient heavy duty internal combustion marine engines made; the above strenuous conditions having dictated the type of machine required, and the last twenty-five years have seen the evolution of what is probably the one type of fishing boat engine par excellence, and one which is not matched the world over for usefulness. This is a slow speed engine operating on the 4 cycle principle and built very heavy; the revolutions being from 400 in the smaller engines down to about 250 in the larger horse powers. These engines are mostly manufactured at San Francisco, California, where this business has been located for twenty-five or more years. The following are the names of the most widely used machines in the fishing boats of the Pacific Coast; given in the order of length of time which they have been on the market:— the Union, Atlas, 'Frisco Standard, and Imperial, all of them being of the same general characteristics outlined above.

Hull Construction.

The construction of these fishery vessels, which are employed upon the multifarious work of a canning and fishing company, has to be the strongest possible, so as to enable them to take their frequent hard knocks and rough weather with equanimity, and to be, with their engines, so immune from frailties involving big repair bills, as to be at all times faithful and reliable money makers for their owners. There is some diversity of opinion among naval architects and boatbuilders on this coast as to what is the most suitable form of hull construction by which they shall be made as staunch and tight little craft as ever fisherman was glad to have under him in stress of weather. Some of the methods now being employed are roughly shown in the accompanying sketches:—

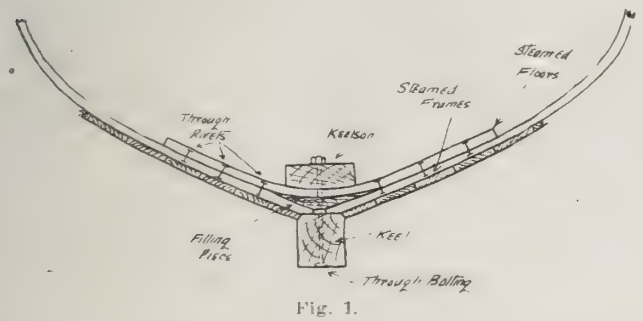


Fig. 1.

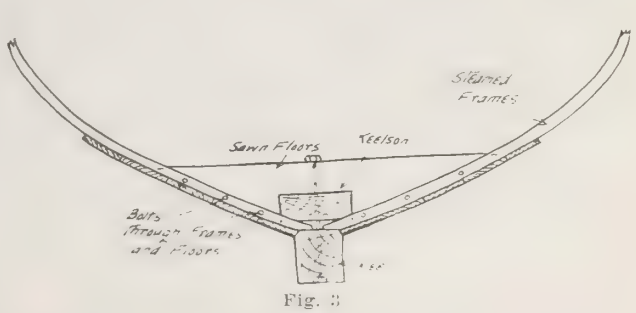


Fig. 3

Fig. 1 shows a system of steamed frames having steamed floors of stiff section laid on the tops of them; the two being riveted together. In this system,

the intervening space between floors and the heels of the two frames is filled in with a piece cut to suit each section. On top of all is laid a stout keelson; the whole being through bolted. Fig. 2 shows a plain hogpiece, which is sometimes used in conjunction with the construction shown in Fig. 1; being laid in short sections along the top of keel between frames and bolted through as shown; the object being to give solid backing for the garboard strakes.

Fig. 3 shows an entirely different scheme. In this method the frames are steamed oak and the keelson is laid directly on top of their heels and through bolted. The long bolts also pass through the deep sawn floors; the latter being secured to the frames by side bolts. Fig. 4 shows the most solid method of all, being composed of a hogpiece laid directly along top of keel and notched to receive the heels of the frames. The deep sawn floors are notched over the hogpiece and lie on the tops of the frames, to which latter they are through bolted; the whole outfit being then through bolted to keel. In methods 2 and 4 the idea of the hogpiece is directly derived from the old-fashioned and staunch method of having the keel backrabetted, Fig. 5; the expense and difficulty of obtaining one clean stick for this type of keel being overcome by making it and the hogpiece separate.

Atlantic and Pacific Practice.

Now it would add immensely to the available knowledge and experience of fishing boat construction in Canada, if our brethren, who are engaged in designing, building and operating fishery craft on the stormy waters off the east coast of the Dominion, would outline their ideas, and, through the medium of this paper, give, by sketch and description, the results of their experiences as to what has proved to be good and wholesome in the building of power and sailing fishery vessels for the North Atlantic. Such an interchange of ideas and general practice in this distinct and most interesting branch of naval architecture might be carried on month by month between representatives of the Atlantic and Pacific Coasts of Canada.

For many years the only type of fishing craft employed in these waters was what is locally known as the "Columbia River Fishing Boat"; a double-ended sailing craft of from 26 to 30 feet l. o. a., and which when looked at in plan view somewhat resembled a French-Canadian "Bateau" in outline. These boats are of very light draft and carry a centre-board when under sail. The necessity

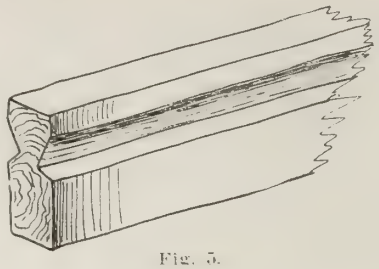


Fig. 5.

in later years for all fishing craft to be reliable in their time keeping led to the almost universal installation of auxiliary engines in these "Columbia River Boats," but owing to their very broad beam and light draft they are very unsuitable for use as power boats and are unpleasantly apt to "broach to" without notice when being driven under power alone in anything of a seaway. A sturdy type of pure power vessel is, therefore, now the rule, and a plain sailing craft the exception on B. C. fishing grounds.

Local Types Not Always Best.

Speaking of "local" types of boats, it is often said that the style of craft which the fishermen of any locality have evolved during years of fishing experience in that place is, of necessity, the best for all round purposes in such waters. This does not always apply. For example, in Japan the fishemen put out on the deep in what is known the world over as a "Sampan," one of the worst constructed crafts that float, or attempt to do so. There are no frames at all in the "Sampans" and the planks are fastened together by the system of "secret nailing," shown in Fig. 6; the holes cut out to enable the nails to be driven being afterwards filled up with small square plugs. These craft frequently fall to pieces in heavy weather and now the Japanese fisher folk are actually installing engines in them for auxiliaries, though to be truthful, they are putting in a few frames around the engine beds. We may, however, learn something from even such crude methods as this is a useful system for fastening the planking in watertight bulkheads, for medium sized wood vessels, where the bulkhead planking would be of 1 to 1 1-2 inches and double-laid diagonally fore and aft on sheets of painted canvas.

Dearth of White Fishermen.

The mention of the Japanese "Sampan," so very familiar to all those who have visited the ports of Asia, brings to mind the serious fact that at the present time the vast British Columbia Fisheries are dependent for their operation upon Asiatic and Indian fishermen. This is a state of things which should never have been allowed to develop and exist; but, now that it is so, we are up against the problem of finding sufficient white fishermen to work our increasing fishing industries, and the type of white man who is a born fisherman and is reliable, painstaking and patient in his work afloat, hardly exists, strange to say, in this essentially marine province of B. C. Sir George Doughty has stated that he expects to try the experiment of bringing over some of the hardy North Sea fishermen from the east coast of Great Britain, than whom there are no better in the world; while Dr. Grenfell, of Labrador, is hoping to soon be able to induce some of the sturdy fisher folk of that country to emigrate here and help in fishing the prolific grounds of these waters.

Which ever way the matter may be brought about, B. C. most certainly needs a white fisher community; both to operate their own craft and the fleets of the great fishing interests; also to settle along the coast and bring up "sons of the sea" from whom to draw those who will man Canada's naval vessels on the Pacific.

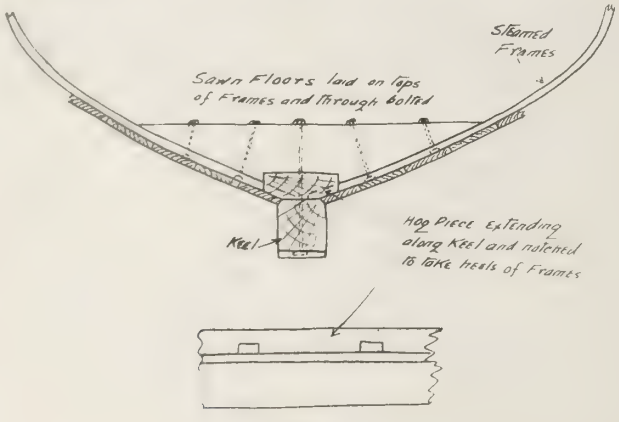


Fig. 4.

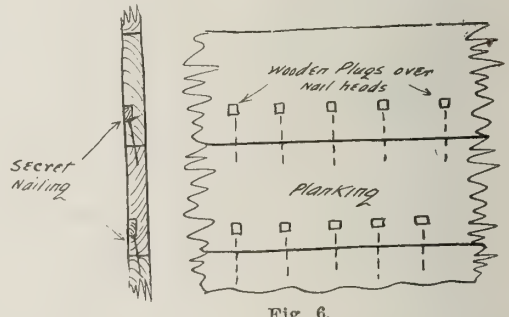


Fig. 6.

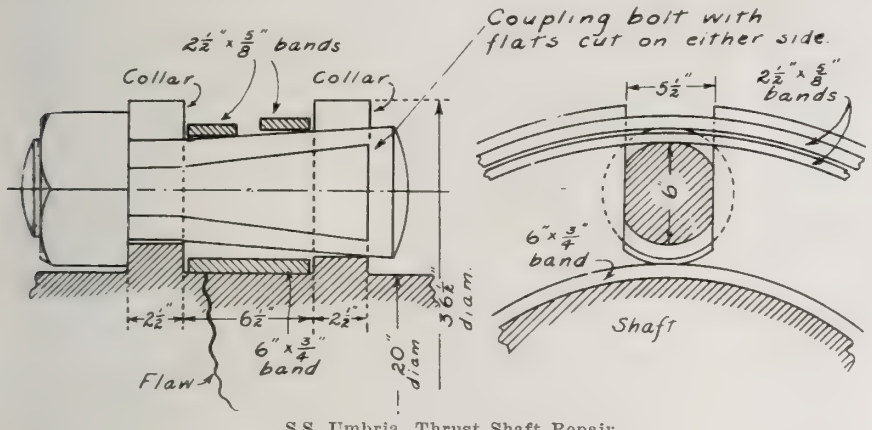
READERS' NOTES AND VIEWPOINT

Devoted to Brief Article Contributions Covering Experiences, Correspondence and Comment on Matters Marine. We Pay for Suitable Material.

OLD STORY RE-TOLD.
S.S. Umbria Thrust Shaft Repair.

By Frank Walker.

AN unpleasant experience which caused some excitement in shipping circles occurred to the Cunard s.s. "Umbria," in December, 1892, while outward bound from Liverpool to New York. This vessel was at that time one of the crack "Atlantic greyhounds" and was with her sister ship, the "Etruria," among the last of the big single-screw boats engaged in the Western Ocean mail and passenger trade.



S.S. Umbria, Thrust Shaft Repair.

Break in Thrust Shaft Body.

On the second day after leaving Queenstown the thrust bearing commenced to heat badly and in spite of the closest attention, continued to such an extent that it was decided to stop and make a careful examination of the cause. When the thrust block was stripped and the horseshoes removed, a serious flaw was discovered, extending almost around the shaft between the third and fourth collars from the forward end. Probing the crack with feelers elicited the fact that it was of great depth, the shaft being practically broken in two. The latter, an open-hearth, mild steel forging, was a large one, even as shafts go nowadays, its length being a little more than 20 feet over all and its diameter 20 inches. It carried 15 thrust collars, each 36½ inches diameter by 2½ inches thick, spaced 6½ inches apart.

After mature consideration it was decided, in view of the great value of the ship and cargo, to refuse assistance, for the time being, and endeavor to effect, by means of her own mechanical staff, a sufficiently adequate repair to enable the vessel to return to port under her own steam. In this undertaking the engine room staff were entirely successful and seldom has a heavier or better repair job been done at sea.

Scheme of Repair Adopted.

The repair methods adopted were as follows:—

The 4 forward horeshoes were discarded, and to bind the broken ends of the shaft together a band or yoke, bent from the stoutest material available, 6 x ¾ inches flat bar iron, was bolted in two halves snugly around the flaw. Four notches 5½ inches wide extending almost down to the shaft were cut in each of the collars on either side of the break—that is the third and fourth from the forward end. These notches were cut opposite and parallel to each other and spaced 90 degrees apart. Into each pair of notches, and acting as driving pins, spare coupling bolts 6 inches diameter by 18 inches long were fitted; parallel flats being chipped on the bolts in order that they might be fitted properly and take a good bearing. Around the four bolts and binding them securely in the notches a second pair of bands bent from 2½ x ⅝ inch flat bar iron were snugly bolted. Under the shaft in the space between the first and second collars a stout chain sling was passed, the ends of which were brought up together and secured to a rigging screw suspended from an eye-bolt in the roof of the tunnel mouth. This prevented any downward thrust or sag of the broken shaft.

The accompanying sketch explains the details and it will be readily understood that the amount of work entailed was enormous. The eight notches 5½ x 2½ x 8 inches deep, had to be cut entirely by hand—ratchet, brace and drill, hammer and chisel—as also had the flats on the coupling bolts; but after 64 hours of continuous labor—it is on record that men dropped exhausted with the tools in their hands—the repairs were completed and so thorough was the job that, after a careful trial, the captain decided not to turn back but to continue the voyage to New York at reduced speed. The Umbria arrived there safely, seven days overdue, but in time, if I remember rightly, to land her passengers for Christmas day.

A survey of the vessel was made in New York, but the repairs were found so satisfactory that she was allowed to return to Liverpool in ballast, which she did at half speed. Events like this prove what our sea-going engineers can accomplish when they are "up against it."

Mariner's Compass, Its History and Practical Value

By Cinders

This article is the introduction to a course of lectures delivered by one of the Dominion Government examiners of masters and mates before the students of a school of navigation, and will, it is believed, in conjunction with those appearing in subsequent issues of our journal, not only provide fascinating reading, but tend likewise to a more intelligent conception of the important place the mariner's compass fills in the commerce of the world.

ONE thousand years ago, navigation was conducted by the aid of sight alone, and the mariner had the sun, moon, stars and landmarks as his only guide. The most courageous seaman seldom dared to venture far beyond the sight of land, for the heavens were at any time liable to be overcast with clouds or fogs for days together, and then without any guide by which to direct a course, he would be utterly lost upon the trackless ocean. Navigation was, therefore, confined to very narrow limits, and a trip across our lakes or similar bodies of water in other parts of the world, would have been considered

a great undertaking. I am speaking of the days when Europe, Asia and Africa, with a few adjacent islands were the only known world. Authorities tell us that Necho, Sataspes and Hanno were reckoned amongst the ancients as most wonderful sailors when they circumnavigated the shores of Africa.

The Loadstone.

With the discoveries in magnetism, their application and the invention of "The Mariners' Compass," a new aspect was given, however, to navigation, and a great deal more of the geography of the world known. Relative to the mariners' compass is the loadstone, an ore of iron of dark color and a natural magnet, found in various parts of the world. If needles be brought near to it, they will be attracted to its surface and held there. Again, if a piece be fastened to a cork floating upon the surface of a basin of water it will settle in a north and south direction. The loadstone, we understand, was introduced into Europe about the middle of the 13th century, and stood for all there was of a Mariners' Compass.

Many claim to have invented The Mariners' Compass, but the real inventor is perhaps unknown to history. The Chinese claim the honor of the discovery. If the north pole of a magnet be placed on the centre of a steel bar and drawn several times towards one extremity and then be reversed so that the south pole be drawn repeatedly from the centre towards the other extremity, the bar will be magnetized. If it now be balanced upon a point it will at once commence to vibrate and ultimately settle in a north and south direction. This forms the principle on which The Mariners' Compass is constructed. The earth is understood to be a great natural magnet and the attractive influence of its magnetic poles, which are situated a short distance from the geographical poles, is understood to give direction to the magnetic needles. In Captain Edward Parry's voyage of discovery in the Arctic, he says he came upon a certain spot in the north-western extremity of Baffin's Bay, abut twenty degrees or twelve hundred nautical miles from the true geographical poles where the magnetic needle, which had been varying to a large extent for some time, swung absolutely half round the compass and pointed due south. It continued to point thus as he sailed north or towards north, and, therefore, the direction determined the location of the North Magnetic Pole.

The Magnetic Poles.

We must remember that the magnetic poles are never stationary, but ever varying to the east and west and back again in long periods of time. There are two lines on the earth's surface passing irregularly from north to south—one through America and the other across the Eastern Continent, where there is no variation of the needle. East or west of these lines the variations are sometimes considerable. Daily and yearly variations are also apparent, therefore, in order to become a capable navigator, these, too, must be understood. Christopher Columbus had a mind filled with geographical knowledge. He believed the world to be round and that a passage could be made to India by way of the Western or Atlantic Ocean. We can imagine how the ignorant, and those perhaps who had not thought of the matter, must have jeered and laughed at his ideas; but he was not to be daunted. He went to the heads of his country, Ferdinand and Isabella, the King and Queen of Spain, for aid. They did not laugh or jeer and it was arranged to have three vessels fitted out and placed at his disposal.

History tells us that on the third day of August, 1492, Columbus left his Spanish home with the floating compass for his only guide on a voyage of discovery across the wide Atlantic. You will note that we are not told anything of the compass card, and so far I have not yet been able to find out by whom it was introduced. The 32 points into which it is divided I find, however, were recognized as early as 1301. The Dutch claim the distinction of having added the card, but we are not told Columbus used it. His was a bold undertaking, many thought him a fool and that they should never see him or his crew again. Day after day the sun rose and set in its ceaseless round. His crew became discouraged as the novelty wore off, and they wanted to get back. Columbus reasoned and expostulated with them and continued on his course a few days longer, until on the morning of the 12th of October he landed at San Salvador. He believed he had reached India and gave the inhabitants the name of Indians. On his return to Europe he received the welcome plaudits of the world. His opinions, which had been denounced as foolish and visionary, were demonstrated to mankind as established facts, and civilization was due to advance with rapid strides.

Compass Improvement.

Since Columbus' time improvements of every description have been made to the Mariners' Compass and the magnetic needle of to-day is so delicately constructed and so perfectly poised that fractions of a degree of a circle can be measured with keen accuracy. From the floating compass the magnetic needle was balanced upon a steel pivot in a circular box containing a card upon which the different points of the compass were marked. This type of compass is called the "dry card," because it has no flotation power—a liquid to prevent the card from flying round in a seaway. It, too, was a rude instrument compared with the compass of the present day; operating, as it did, sluggishly owing to the great amount of friction on the bearing point, caused by the heavy weight of the magnet and other appendages of the card. This friction on the bearing point was injurious with respect to steadiness and detrimental in blunting or boring it into the cap. For this reason it soon became ineffective. Who has not seen a piece of marlin or spun yarn made fast to the bowl of a dry compass and occasionally twitched by the man at the wheel to "keep the card alive," or, as it is termed in Jack's phraseology, "to keep the compass afloat?" There are quite a number of card compasses of old style, in existence and doing service in some of the old-time schooners of the lake "mosquito fleet." It may be said, however, that they are of little use, and but little reliance can be placed upon them.

The Lord Kelvin Compass Co.

It must not be supposed from the foregoing that the dry card compass is obsolete and out of date, for the finest compass in the world to-day, that invented by Lord Kelvin, is of the dry card type. In constructing this compass, Lord Kelvin came to the conclusion that no weight was to be added beyond that necessary for supporting the card. To accomplish this, a plurality of short needles are used, whereby greater surface is secured than would be the case were the same amounts of material used in a lesser number of the same length.

Manufacturers of compasses at one time were of opinion that steadiness in a seaway was obtained by heaviness of needles and compass card. This is an error. If the addition of weight to the compass card improves it with respect to steadiness in a seaway, it is not because of additional friction on the bearing point. On the contrary, dullness of the bearing point, or too much weight upon it, renders the compass less steady, and at the same time less decided in showing changes of the ship's head than it would, were the point perfectly fine and the friction reduced to the minimum. Increasing the vibrational period, however, gives steadiness. The vibrational period of a compass is the time it takes to perform a complete vibration (to move or swing to and fro) when deflected horizontally through any angle not exceeding 30 degs. or 40 degs. and left to itself to vibrate slowly.

Great Britain's Part in Building Canadian Steam Ships

By the Editor

Being the Fifth of a Series of Short Illustrated Articles Descriptive of Steamships Recently Built and Presently Building in Great Britain and Ireland for the Canadian Merchant and Passenger Trade—From the Details Given, It Will Be Seen That the Latest Fully Proved Developments in Shipbuilding and Marine Engineering are Being Adopted by Those Responsible for the Steamship Service to and From and Within the Dominion.

THE NEW DONALDSON LINER "LETITIA."

THERE was recently launched by Scotts' Shipbuilding and Engineering Co., Ltd., from their Cartsdyke Shipyard, Greenock, Scotland, a steel twin-screw steamer which they have built to the order of Donaldson Brothers for their service between the Clyde and Canada.



Donaldson Liner "Letitia" on the Stocks.



Donaldson Liner "Letitia" on the Stocks

The principal dimensions of the ship are:—Length between perpendiculars, 470 ft., breadth molded, 56 ft. 8 in.; depth molded, 29 ft. 6 in. to the shelter deck, above which are fitted poop, bridge, forecastle and boat decks. The vessel has been designed for the emigrant trade and takes the highest class at Lloyds. Accommodation for second-class passengers is to be found on the bridge, shelter and upper decks; staterooms being provided for over 300 persons.

The dining saloon, music room, writing and smoke rooms are handsomely panelled in polished hardwood and very comfortably furnished. Special attention has been given to the culinary department. The gallery and pantry arrangements are very extensive, the equipment including all the latest improvements. Accommodation is also fitted on the shelter, upper and main decks for about 600 third-class passengers, principally in two and four berth staterooms. Separate dining saloons and recreation rooms are fitted for this class, and a special feature has been made of their lavatory accommodation, which includes baths and washbasins supplied with both hot and cold water.

While primarily intended for passenger trade, the vessel will carry a large cargo, there being five holds served by ten derricks and ten steam winches. During construction, the ship has been under the supervision of Captain Taylor and Mr. Innes, the superintendents of the Donaldson Line. At the launching ceremony, and as the vessel left the ways, she was gracefully named "Letitia," by Miss Grace Donaldson.

Description of Machinery.

The propelling machinery has been built to Board of Trade and Lloyd's special survey. Six single ended boilers,



Donaldson Liner "Letitia" in Dock After Launching.

each having three Morrison suspension furnaces and working under natural draught, supply steam to two sets of 3-cylinder triple expansion engines driving two screws. The high pressure cylinder is 26 inches diameter, the intermediate 43½ inches diameter, the low pressure 72½ inches diameter, and the common stroke 48 inches. Piston valves control the steam to the h.p. cylinders, Andrews' valves are fitted to the m.p. cylinders, and double ported slides to the l.p. cylinders. The columns and bed-plate are of substantial box section.



Donaldson Liner "Letitia" on the Stocks.

The condensers, circular in form, are carried on seatings from the tank top, and are supported by brackets from the backs of the h.p. and m.p. columns. Ample cooling surface is provided to maintain a high vacuum. Working in conjunction with the condensers are air pumps of the well-known Edward's design, while independent centrifugal pumps supply the necessary cooling water.

A steam reversing engine of the all-round type and a steam turning engine are fitted to each main engine. The thrust and propeller shafting is of forged steel, the propellers are about 17 feet diameter and of the built type; the bosses being of cast-iron and blades of bronze. There is an auxiliary condenser and a full equipment of auxiliary machinery to ensure the safe and economical working of the vessel and the comfort of passengers. For the disposal of ashes from the boilers, two of Crompton's silent ash hoists, with the necessary shutes, have been installed. That this should be done as silently as possible is a matter of great importance to and will be appreciated by those persons whose cabin accommodation is in proximity to the machinery spaces. The steering gear is of the Wilson & Pirrie type, controlled by telemotor. A very extensive electric lighting equipment has been installed, and electric fans and bells are fitted throughout. Refrigerating chambers are provided for the ship's provisions and cargo, the plant being on the CO_2 system. Wireless telegraphy will also be installed.

LAST HONORS FOR THE "MAINE."

Havana, March 16.—The solemn funeral rites connected with the sinking of the U. S. Battleship Maine, recently raised from the mud where it has rested since the memorable explosion of February, 1898, and with the carrying to their last resting place of the bodies of many of her sailors took place at Havana to-day.

The old battleship was sunk in the waters of the Gulf of Mexico, the smoke from the saluting guns of the war vessels served as a funeral shroud; while with all the pageantry and pomp of national morurning, the bodies of the sailors were taken back to Washington.

The decks of the old battleship were hidden beneath great masses of floral offerings, and her escort was composed of warships belonging to the U. S. and the Cuban navies.

The funeral procession was formed up in front of the palace. It was led by the municipal band and was followed by the scarlet-coated marine band of the North Carolina, a company of marines in full dress, and two companies of sailors in white uniforms. Then came the 34 cases containing the caskets with the sixty-five bodies, covered with wreaths of palms and flowers, each on the shoulders of six khaki clad Cuban artillerymen. Cuban infantry lined the streets.

MARINE ENGINEERS' UNION.

It looks very much like trouble between the Marine Engineers' Union and the Toronto Ferry Company, when the season opens between the Island and city. For years the men employed by the ferry company have been urged to join the union, and they have refused. The union have appealed to Manager Solman, who replied that he had no objection to his employees joining the union; in fact, he advised them to do so, and he could do no more. It is admitted by the union that the men receive perhaps a little better pay, but they will not join the union.

Now, the engineers are going to declare for a closed shop principle, which means that if these men do not join the union, all trades unions will be asked not to visit the Island by the steamers of the Toronto Ferry Co. It would also mean a boycott of the baseball grounds and in fact anything connected with the ferry company. It is understood that the matter will be discussed by the District Trades Council.

NAVIGATION OPENING LATE.

All hope of an early opening of navigation from the sea to Montreal has been abandoned in marine circles, and shipping men are looking with considerable misgiving to an unusually late inauguration of river traffic.

With the Government ice-breaker Montcalm crippled by a broken rudder, the situation is still worse, as no other steamer of the Government fleet is capable of performing the work done during the past two or three seasons in breaking up the ice bridge and opening the channel to the sea. A year ago, on April 8, the Montcalm had worked her way up the river as far as Sorel, but it was reported from the latter place that heavy teams were still using the ice road between there and Berthier, and that the ice showed no signs of breaking up on the above date.

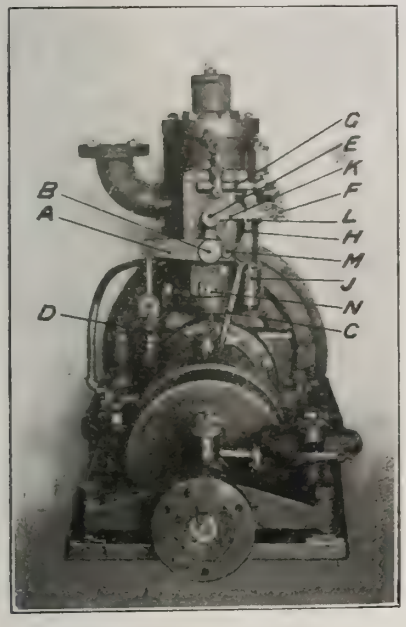
The Richelieu and Yamaska rivers, which as a rule are clear almost a week before the St. Lawrence ice commences to move out, were reported to be still solid, the ice being unusually thick. The Montcalm probably will be out of commission for some weeks, while the work of building and installing a new rudder is being accomplished.

PROGRESS IN NEW EQUIPMENT

There is Here Provided in Compact Form a Monthly Compendium of Marine Engineering Product Achievement.

TORBINIA ENGINE AND CAPSTAN.

THE Nat marine oil engine and Torbinia hydraulic capstan were first placed on the market about 12 months ago by the Motor Mercantile, Ltd., but owing to rapid growth of the business, a new company has since been formed



Nat Marine Oil Engine.

under the name of The Torbinia Engineering Co., Ltd. During the past year several changes have taken place in connection with the designs of both engine and capstan.

Engine Details and Operation.

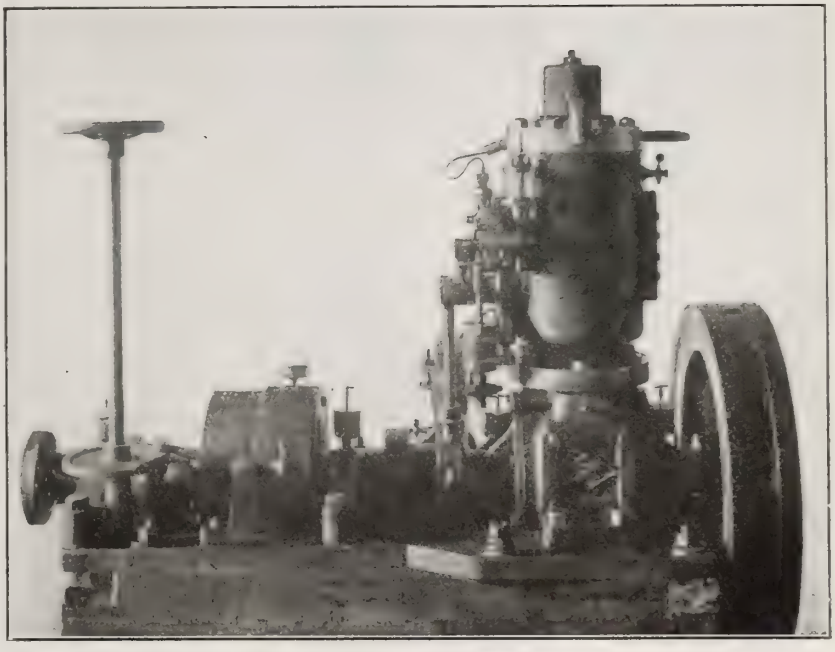
The engine, of the semi-Diesel class, here described, is the single cylinder 6-8 h.p. size, coupled to an epicyclic reverse gear and clutch mounted on a one bed plate casting. The cylinder bore and stroke are each 6½ inches; the r.p.m. being 400 when developing the rated power. It is of the three-port two-cycle type with "hot-pot" ignition. On the down stroke the air is slightly compressed in the crankcase, being admitted to the cylinder head through a port at the commencement of the up stroke. Fuel is sprayed into the hot bulb just before the top of the stroke through a counter-sunk jet. The compression is between 150 lb. and 200 lb. per square inch. For starting purposes the initial heat is obtained from a special lamp, four minutes application of which to the combustion chamber is sufficient to get the engine running without any priming with petrol. All accessory gear has been arranged at the after-end of the engine, and everything is particularly accessible; while pumps and other exterior gear are operated off one rocking lever, driven by an eccentric between the crankcase and clutch.

In the "hit and miss" governing gear a novel feature has been introduced, the old centrifugal governor having been discarded. The new control is pneumatic in action, and by its adoption the engine speed can be controlled by one small wheel valve, no hand levers of any description being fitted, except the wheel operating the clutch and reverse gear. For the purpose of description we give an illustration showing the main rocker and its connections. The main rocker (A) swings on the spindle (B), and is actuated by an eccentric on the crankshaft extension by the rod (C). The left side of the rocking lever (A) operates the water circulating pump (D), which is of the plunger type; while on the bell crank extension (E) is swung a striker, (K) operating the fuel pump (G) by striking a wedge on the small rocker (F). Another connection on the main rocker (A) shown at (M) operates the lubricating plunger type pump, which, although not shown in the illustration, is fixed at (N).

It will be noticed that the striker (K) rests on a fulcrum (L) projecting from the vertical rod (H), the reason for which we will proceed to make clear, it being a very important feature of the automatic control. At the end of this vertical rod (H) is attached a piston working in a dashpot (J), while the rod itself is operated by a connection from the rocker (A).

The down stroke of the piston takes place under the action of a spring, the only outlet for the compressed air being at the bottom of the dashpot (J) through a small wheel valve, which can either be fixed to the dashpot or be connected to the latter by means of a small pipe, the valve itself being located in any convenient position on the boat. It will be seen, therefore, that the downwards movement of the piston, and, consequently, the angular swing of the striker (K) are controlled by the opening of the wheel valve. When the latter has been set for a pre-determined engine speed, the duration of the exhaust period, and, consequently, the rate of travel of the piston rod coincides with the movement of the rocking arm (A) and the striker (K) actuates the fuel pump. However, if the engine speed increases, the synchronism between these two motions is upset, the constant speed of the piston rod H on its down stroke being no more in accordance with the accelerated motion of the other parts. Under these conditions, the striker (K) will be deflected from its usual position, thus failing to operate the fuel pump (G) until the resulting decrease in driving effort brings the speed of the engine back again to its normal value. The normal stroke of the piston in the dashpot is very small, being only about ⅜ inch.

The remaining features of the design follow general practice, excepting, per-



Nat Marine Oil Engine.

caps, the water cooled silencer which is mounted on the elbow piece on the port side of the engine. On either side of the cast iron crank case are large inspection doors, although not of sufficient size to remove the piston. Removal of the latter is easily accomplished by detaching the water-cooled cylinder head, there being no gear to remove. Thus, to get at the piston is merely a matter of about one minute. A fairly heavy flywheel, notched to take a starting lever, is fitted, the weight being 250 pounds. Without reverse gear the weight of the 6-8 h.p. engine is 840 pounds, while the latter brings the total up to 1,120 pounds; by no means excessive for this class of motor.

Torbinia Capstan.

Turning to the Torbinia capstan, it is interesting to note the recent improvement in construction. It will doubtless be remembered that in the old type the drive from the hydraulic transmission to the winding barrel was by means of planetary pinions and an internally-cut gear. However, by adopting a worm gear at the upper end of the vertical shaft, the pair of pinions in the body of the capstan have been discarded, and the drive is now more direct. Regarding the latest design of the capstan, brief details will not be out of place. The general principles have been maintained and the capstan can be driven either off the main engine or by an auxiliary motor, so its use is not confined to oil-engine installations.

The capstan is built up on a heavy cast-iron plate bolted to the vessel's

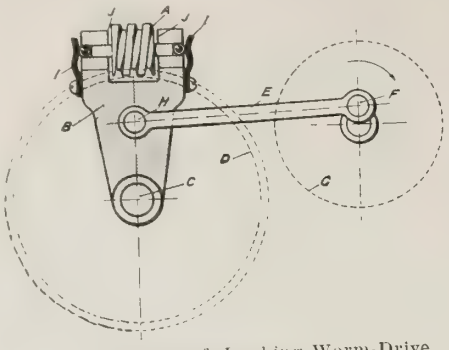
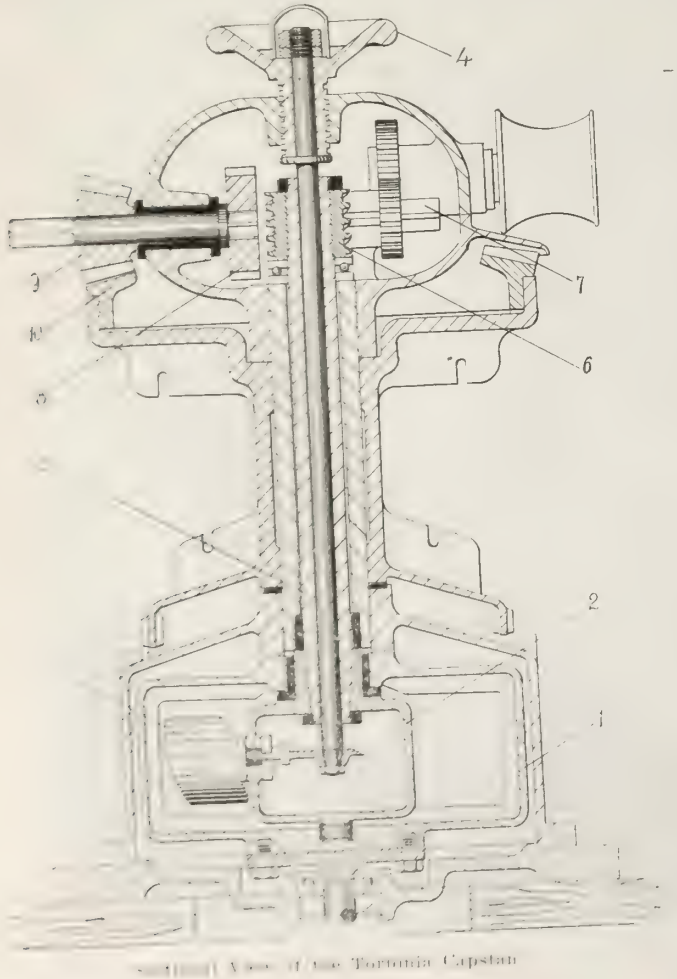


Fig. 2. Diagram of Jambing-Worm-Drive, Torbinia Winch.

deck, through which is carried the vertical operating shaft to the driving unit below decks, while the section of the operating shaft projecting through the deck is enclosed in a cast-iron casing, which contains a bevel-gear drive, operated, of course, by the main engine or auxiliary, as the case may be. In the lower portion of the capstan is a drum, which is fitted internally with a number of webs or vanes, and contains water. This drum is rotated by the driving shaft that leads through the deck.

Running within the drum is a cage fitted with exterior feathering blades, the pitch of which is controlled by a hand wheel at the top of a solid vertical shaft. As the drum rotates, centrifugal force throws the liquid against the wall and pockets of the drum, and impinging against the vanes of the cage, the power is hydraulically transmitted to the hollow vertical shaft, thence through a worm and worm wheel to a secondary shaft, which in turn, through ordinary gearing, drives the capstan barrel through a crown wheel rigidly attached to the barrel itself. Thus it will be seen that the maximum force of transmission is obtained when the vanes on the cage are at right angles to the flow of liquid, and when the planes of the vanes coincide with the plane of rotation there is practically no transmission, as the edges of the blades are exposed to the revolving liquid. As the cage is entirely free from the drum, there can be no strain on the driving unit, should the resistance be greater then the transmission force, therefore the capstan will not continue hoisting



Vertical View of the Torbinia Capstan

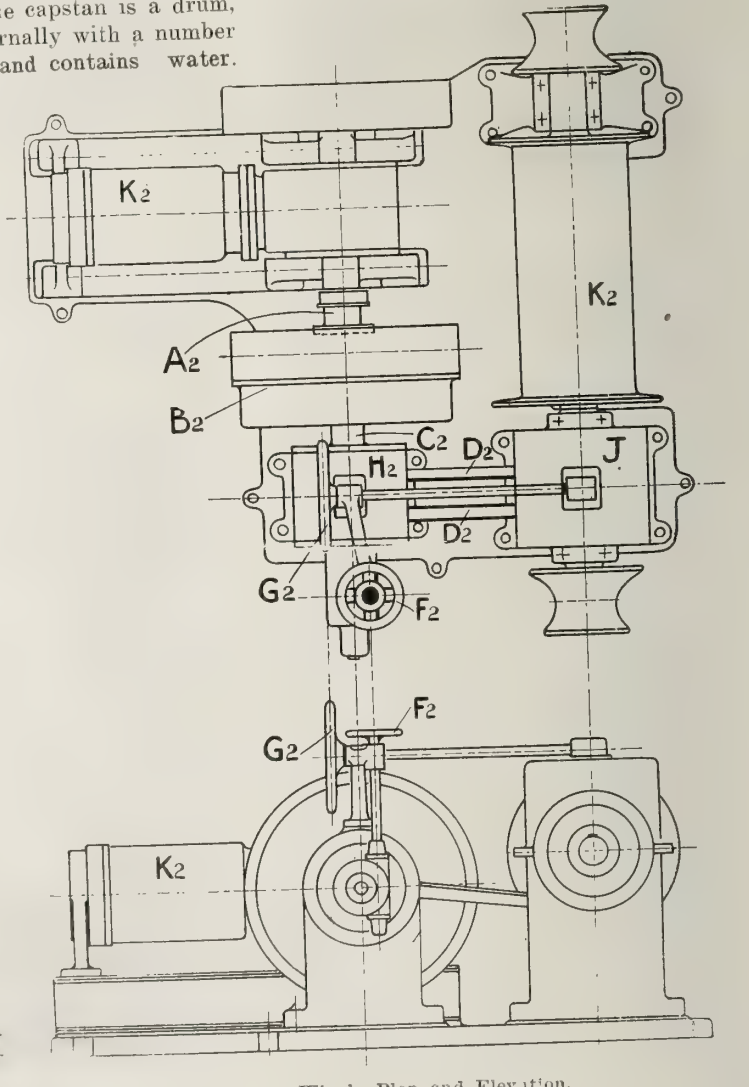


Fig. 1. Torbinia Motor Winch, Plan and Elevation.

until the excessive strain is eased off. By altering the pitch of the central vanes, through the medium of the hand wheel, the power transmitted and speed can be varied as required.

Torbinia Motor Winch.

The Torbinia hydraulic system has also been adopted in a new motor winch recently placed on the market. Fig. 1 shows the plan and end elevation of a complete set, the Nat engine hydraulic transmission and winch being mounted on the one bed plate. In this particular case, the engine has been arranged horizontally, as the set is being installed on the deck of a barge which has to pass through low tunnels.

We will first deal with Fig. 2 before remarking on the general arrangement, as this is the most important feature of the design, and embodies a novel principle. Briefly, the drive, after passing through the hydraulic transmission, consists of duplicate worm and gearwheel drive, driven by eccentric motions, while control is obtained, by frictionally locking or releasing the worm drives, in addition to feathering the vanes in the transmission drum.

At the end of the shaft leading from the hydraulic transmission is a pulley G, which eccentrically drives at F the rod E, giving the carrier B (which is swung on the shaft of the winch winding drum at C) an oscillatory motion. On the carrier B is mounted a worm wheel A, which meshes with the wheel D, the latter being permanently fixed to the winding drum shaft. The worm A is machined at each end, flush with the faces of the carrier B at J, the object of which will presently be apparent. It will be noticed that each end of the spindle of the worm A rests against a steel ball, and that the levers I hold the balls against the spindle, thus preventing either of the end faces of the worm A being in contact with either face J of the carrier B. When in this position, the worm is free to revolve, and the oscillatory motion of the carrier B does not cause the worm A to turn the gearwheel D, which, as before stated, is secured to the same shaft as the winding drum.

A noteworthy point is that the angle of the worm A just exceeds the critical angle, so that the friction between the worm A and the teeth of the wheel D is not enough to prevent rotation of A; but by moving one of the levers I, one of the faces of the worm A comes in contact with a face J of the carrier B. The resistance thus obtained will prevent the worm A rotating on its own axis; and so the reciprocating movement of carrier B causes the worm A to turn the wheel D, incidentally turning the winding drum. On the return stroke the ball at the opposite end of the spindle is held in place by the other lever, so the worm A freely rotates. By duplicating this arrangement, a continuous motion is imparted to the winding drum. It is important to state that by sliding back the first lever into position and removing the other, the movement of the wheel D, also the drum, is reversed.

To go back to the general arrangement as shown in Fig. 1, the Nat oil engine K, drives the torbinia hydraulic transmission B_2 by the shaft A_2, thence the motion is imparted to the secondary shaft C_2. This shaft carries the two eccentric pulleys H_2, operating the worm carriers at J by the rods D_2. The winding drum is K2, and there are two warping drums at the ends. For controlling the winch and transmission but two hand wheels are necessary. The hydraulic transmission which regulates the power and speed is controlled by the wheel F_2, while the wheel G_2 operates the levers on the carrier holding the worm in position, that is to say, controls the direction of rotation of the winding drum, and also gives a stop position independent of the hydraulic drive.

OIL INSTEAD OF COAL.

The Richelieu & Ontario Navigation Co.'s steamers Rapids Prince and Rapids Queen are at Sorel fitting out for the coming season. Oil burning apparatus is being installed in the boiler furnaces.

The big freighter, Indian, being built by the Clyde Shipbuilding Company, and which will be ready for service in June, marks the Merchants' Mutual Line first experiment with an oil-burning steamer.

The Niagara, St. Catharines & Toronto Navigation Co., who in the near future intend to build a sister steamer to the Dalhousie City, are watching with interest the experiments being made with the oil-burning steamers and are contemplating adopting this system for their new steamer.

CHRISTMAS TRIP TO MONTREAL.

W. D. Reid, president of the Reid-Newfoundland Co., declares that he will come up the St. Lawrence to Montreal next Christmas on board the steamship Bruce. He has always been a believer in the winter navigation of the St. Lawrence, especially as far as Quebec and Montreal up to New Year's day, are concerned; basing his belief on the fact that the old Bruce, during nine year's service between Cape Breton and Newfoundland, frequently made her way through ice as strong as that ever formed on the River St. Lawrence at that date. A great many hints were taken advantage of during the building of the present Bruce, and the ripe experience of Capt. Patrick Delaney, superintendent of the Reid Co. fleet, was also coralled; while people were consulted who had had a lifelong familiarity with the ice of the Baltic Sea and the rivers in Russia.

WAILES, DOVE & CO.

MESSRS. Wailes, Dove & Co., of Newcastle-on-Tyne, have established an agency for the sale of their goods in Montreal. The materials have been essential to the ship-building, bridge building and structural steel trade in England for over 20 years, and results obtained from every quarter has fully justified their use. There are three compositions manufactured by the company.

1st.—Bitumastic solution for protecting iron and steel work from corrosion. Being perfectly elastic it does not scale off or break, nor is it affected by heat or cold. It is applied like ordinary paint, and guaranteed to last intact for years without further painting.

2nd.—Bitumastic enamel, of somewhat similar composition, is used principally for coating bunker spaces, tank tops, frames of steamships and for heavy bridge work. It is exceedingly durable and must be applied hot; drying permanentently within a few seconds of application.

3rd.—The third product, bituros, is a composition that will permanently protect from corrosion, iron and steel water tanks, used for drinking water purposes without imparting to the water any disagreeable flavor or discoloration; and being of an elastic and strongly adhesive nature it will not crack or peel off. When once properly applied, no renewal is necessary. These various substances have been largely used in Great Britain and the United States for many yers.

Messrs. Machan & Hebron, 55 St. Francois Xavier street, Montreal, the representatives, also carry agencies for the Yorkshire Copper Works, Ltd., of Leeds, for solid drawn copper and brass tubes; Emerson, Walker & Thompson Bros., Ltd., Gateshead-on-Tyne., for patent steam windlasses, winches, etc.; the Seamless Steel boat Co., Ltd., Wakefield, for high class seamless steel boats, launches and motor yachts; the Treibel Smoke Combustion Co., of London, smoke combustors, guaranteed to ensure smokeless combustion and save fuel; and David Corsar & Sons, Ltd., Arbroath, Scotland, in lines of all sorts of flax canvas, awnings, ducks, roping and seaming twines.

Notable Personalities of Canada's Merchant Marine

By the Editor

The Part That Shipbuilding, Marine Engineering and Shipping Companies Have Played in Bringing Canada Prominently Before the Eyes of the Civilized World, Has Not, We Believe, Received That Credit of Performance Which is Its Due. We Hope in This Series Dealing With "Notable Personalities of Canada's Merchant Marine," to Show That Those Who Have Bridged The Trackless Ocean to our Shores, and Provided the Facilities for Our Disembarkation, Are Worthy of at Least a Sentimental Regard.

THE LATE F. W. DOTY, SEN.

FRED W. Doty, sen., President of the Doty Engine Works, Ltd., of Goderich and Winnipeg, died suddenly of heart failure on Feb. 26, at his residence in Goderich, Ont. Mr. Doty had not been well for several days, but had been attending to business as usual. Only fifteen minutes before the call came, he had been in conversation with his son Fred.

The deceased had been a resident of Goderich for the past eleven years, going there from Toronto in 1901 to manage the Goderich Engine Co., and later



THE LATE F. W. DOTY, SENR.

establishing the Doty Engine Works Co., for the manufacture of marine engines, which business he conducted to the time of his death. He was born at Niagara Falls nearly sixty-one years ago. At an early age he went with his parents to live at Oakville. Growing to manhood he was married to Miss Eleanor Williams, who passed away about a year ago. They made their home at Toronto, where the deceased's father, the late John Doty, was at the head of the John Doty Engine Works. While living there, the subject of this notice was head of the Doty Ferry Company, which ran boats from the mainland to the Island for several years.

About two years ago, owing to an increase in the Western business of the company, it was found necessary to open a plant at Winnipeg, and since then, Mr. Doty had spent a good deal of his time in the Western city. He was a man of more than ordinary business ability, having a reputation as one who was capable of handling large enterprises. In his private life he had a great fondness for music and was a violinist of more than ordinary ability. He is survived by four sons and one daughter:—John, of New York, a well-known civil engineer; Charles and Fred, of Goderich; Frank, of Winnipeg; and Miss Mabel, attending Loretto Abbey School, Toronto.

A NOTED CLYDE SHIPBUILDER DEAD.

A WELL-KNOWN figure in Clyde shipbuilding circles has been removed by the death of Mr. John Ward, which took place somewhat suddenly at his residence in Dumbarton. Mr. Ward, who was in his sixty-fifth year, was born in Stranraer. In Messrs. Earle's yard in Hull he gained his first experience of shipbuilding, afterwards being employed in the Millwall shipbuilding yard, one of the principal concerns on the Thames. From the Thames he migrated to the Clyde, and was engaged in Messrs. Steele's yard at Greenock.

The turning point of his career came in 1872, when he was appointed chief draughtsman with Messrs. Denny Bros., Dumbarton. Five years after entering the drawing office he was appointed manager of the yard, and fully a quarter of a century ago became a partner of the firm.



THE LATE JOHN WARD.

In late years this firm have been noteworthy as being the first to apply turbine machinery to passenger vessels, the Clyde steamer King Edward being the pioneer of this type; followed later by the Queen Alexandra, recently purchased by the C.P.R. for their Pacific coast service and re-christened Princess Patricia. In this departure Mr. Ward took an active interest. He was also chiefly responsible for the building of Sir Thomas Lipton's two America Cup challengers, Shamrock II. and Shamrock III. His firm also built the Allan liner, Bavarian, which vessel it will be remembered was wrecked on the St. Lawrence, below Quebec, some years ago, during a heavy fog. Mr. Ward was twice president of the Institution of Engineers and Shipbuilders in Scotland. He was a member of the Council of the Institution of Naval Architects in London, a member of the North-East Coast Institution of Engineers and Shipbuilders, and of the Technical Sub-Committee of Lloyd's Registry, and a life governor of the Royal Technical College, Glasgow.

Mr. Ward was also a member of the Executive of the Shipbuilding Employers' Federation, and took part in all the recent conferences at Edinburgh and elsewhere. He is survived by his widow and a grown-up family.

NEW STEAMER NAMED.

The Thousand Island Steamboat Company received over 6,000 suggestions for naming their new steamer now being built at Toledo, Ohio. The one selected was "Thousand Islander," which was proposed by many contestants. Miss E. Walsh, of Kingston, Ontario, was the first to send in this name and receives the prize of $25.00. As the steamer is an American vessel, and will run in International waters, the management has awarded an additional prize of $30.00, divided equally between the second and third proposers of "Thousand Islander," viz., Mr. G. H. Dreybus, Traffic Agent, International Railway Co., Buffalo, N. Y., and Mr. R. L. Jackson, Chief Clerk to General Agent, New York Central Lines, Watertown, N. Y.

PORT NELSON AS HUDSON BAY RAILWAY TERMINAL.

THAT Port Nelson shall be the terminus of the Hudson Bay Railway in preference to Fort Churchill is decided by the report of Chief Engineer J. Armstrong, in charge of the construction of the road, and of the surveys which have been in progress during the last two years to determine routes. This report, dated January 23rd last, was tabled in the Canadian House of Commons on March 4th by the Minister of Railways and Canals. In brief, Mr. Armstrong finds that while Fort Churchill has naturally the better harbor protection, it has an inadequate site available for railway termini; is open for only five months in the year, and involves a longer and more expensive route, with greater cost of annual maintenance. Port Nelson, on the other hand, has ample and easily utilized terminal sites, is open seven months in the year for navigation, and from the standpoint of ultimate utility is decidedly to be recommended. A comparison of routes shows that the distance from the Pas to Port Nelson is 418 miles, as compared with 498 to Churchill. The Port Nelson route has a gradient of only 4-10 of 1 per cent., and on an estimate of 3,000 trains per year could be operated, including all interest charges, for about 3,000,000 dols., or about half a million less than the Fort Churchill route.

As to the question of terminal sites at Port Nelson, it is interesting to note in view of the recent Order in Council giving Ontario the south side of the harbor mouth, that Mr. Armstrong declares suitable terminal sites are available on either side of the river. The cost of terminal development at Port Nelson, having in view the handling of from 60 to 70 million bushels of grain within sixty days, is estimated at 20,000,000 dols.

A comparison is given between the proposed route from Saskatoon to Port Nelson, across to Hanna Bay, and thence via the Quebec and Lake St. John Railway to Quebec, and the present route from Saskatoon to Fort William and Montreal via Parry Sound. The total length of the former route is 1,950 miles, of which 750 miles is water carriage; the total length of the latter is 1,950 miles, of which 680 miles is water carriage.

GEORGIAN BAY CANAL.

OUR illustration of the French River from the Georgian Bay to Lake Nipissing was that recently submitted to the Federal Government at Ottawa. A deputation from the Ottawa Valley urged the Cabinet to begin work on the French River section of the Georgian Bay canal. The diagram illustrates what the northern people want, and why. The citizens of North Bay are particularly interested in the project, and they are supported by the Associated Boards of Trade of Ontario in the request to make navigable the 49 miles from the Georgian Bay to Lake Nipising. Should the undertaking be carried out, North Bay, the gateway of New Ontario, would become a grain depot, being favorably situated on the C. P. R.; while the T. & N. O. line from the G. T. P. and the C. N. R. will come in from the east. It is estimated that 35,000 horse power can be developed from the locks in the French River stretch of the proposed canal.

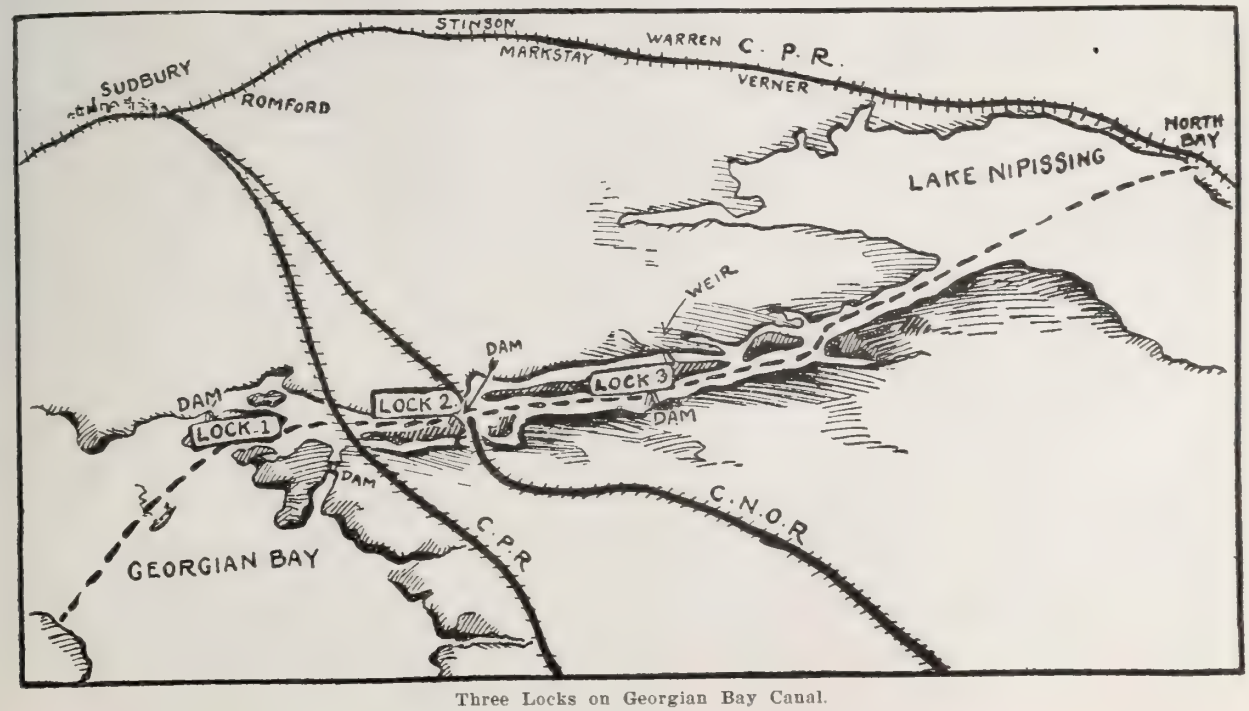
C. N. R. STEAMSHIP SERVICE

The New York American publishes the following:—An agreement, reached between the Cunard Steamship Co. and the Canadian Northern Railroad, has created much interest in steamship circles here, while it has set at rest many speculations as to the future policy of one of the most progressive railroads in the Dominion. With the completion of its coast-to-coast system, the Canadian Northern will be in a position to wrest a large portion of the transcontinental traffic from its rival, the Canadian Pacific. The latter company, with four steamers and its working agreement with the International Mercantile Marine, which has six steamers in the Montreal run, had an advantage over the Northern that only the acquisition of a fleet could equalize.

Uranium Line Secured.

Both Sir William Mackenzie and D. B. Hanna, president and third vice-president of the Northern, have been busy in New York and London for the last two months. They finally reached an agreement whereby the Cunard Line, with its three steamers now in the Montreal service, and two larger ones building, would combine with the Royal Line and the Uranium Steamship Company, the latter concerns being controlled by the Canadian Northern.

The new arrangement means that eleven steamers will feed the Canadian Northern road, as against the ten vessels that will form the connecting link between Liverpool, Antwerp and Montreal for the Canadian Pacific.



Three Locks on Georgian Bay Canal.

MARINE NEWS FROM EVERY SOURCE

Forming a Concise Record of What is Being Done and Happening at Home and Abroad, and Providing a Means Whereby Readers are Kept in Intimate Touch with Marine Progress, Development, Etc.

Canada

Quebec.—Official information has been received here that the Federal Government will begin at once to call for tenders for the erection, under the Dry Dock Act, of a huge graving dock in the port of Quebec, the dimensions to be 1,150 feet in length, 110 feet wide, and at least 37 feet deep. The act provides that the company tendering shall submit with its tender a report of its engineers establishing the advantages and disadvantages of the two respective projected sites, one at Levis and the other at the mouth of the St. Charles River. Tenders must be sent on or before May 20.

Quebec.—The question of rebates on shipping rates, which are prejudicial to the interests of Quebec, was recently laid before the Council of the Board of Trade at a special meeting by the Wholesale Grocers' Association. A motion to the following effect was passed: "That the secretary be instructed to write to the Minister of Trade and Commerce, asking that all ships owned or controlled by steamship companies subsidized by the Government of Canada to carry European mails shall be bound by the subsidy contract to carry freight and passengers to and from Quebec cheaper than Montreal rates, in the proportion of the mileage saved, and that all freight shippers shall be treated alike as to rates and rebates.

Quebec.—At a recent meeting of the Council of the Quebec Board of Trade, it was decided to memorialize the Government afresh in regard to winter navigation on the lower St. Lawrence. The memorial will set forth the new records made by the Government steamship Montcalm and the steamer Mahone during the season just passed, and the possibilities of winter navigation, especially when carried on by larger and more powerful boats. Another memorial is to be submitted to the Government with regard to the deepening of the St. Lawrence below Quebec.

Port Dalhousie, Ont.—The following craft have been wintering here:—Steamer, Dalhousie City, tug, T. F. Battle and tug, Euphemia, in the harbor; steamer, Garden City; yacht, Butterfly; dredge, Edmund Hall; dredge, Sir Richard; tug, Argyle; tug, Meteor; Government Scow No. 2; and General Construction & Dredging Co. Scow No. 8, at Muir Bros. dry dock. The ice in Toronto Bay prevented the Dalhousie City making her opening trip on April 1st, on which date she was ready to start.

Port Dalhousie, Ont.—A feature of interest, which the building of the new Welland Canal has aroused in the locality through which it will pass, is that regarding the name of the new port to be created at the mouth of the canal about three miles east of Port Dalhousie. A recent letter to the press makes the reasonable claim that it should be named after some of the families connected with shipping in the County of Lincoln. Norris, Nielon, Muir, Shickluna and Andrews are names mentioned, but as Muir is the only name which has survived (the family still operating the dry dock and shipyard at Port Dalhousie), the name "Port Muir" has a considerable following especially among marine men.

Port Arthur, Ont.—The Western Dry Dock and Shipbuilding Co., Port Arthur, Ont., has been awarded the contract for a new stern wheel passenger steamer for the C. P. R. to run on the Kootenay Lakes between Nelson and Robson. The work will be started just as soon as the material arrives, and delivery will be made during the coming summer.

The hull will be erected at Port Arthur, and will then be taken down and shipped to Nelson, B. C., where men from the Western Dry Dock and Shipbuilding Company's plant will rebuild and complete the vessel ready for service. The following are the leading features of the vessel: Length, 200 feet; beam, 40 feet; depth, 8 feet. The engines will be tandem compound with cylinders 16 and 35 inches diameter by 96 in stroke, and the boiler of locomotive type, 90 inches in diameter by 28 feet 4 inches long.

The same firm has also obtained the contract for two Scotch boilers, each 14 feet in diameter and 11 feet long, and a complete boiler room equipment for the steamer Turret Crown.

Province of Ontario.—The Provincial Government have provided the following expenditures in their supplementary estimates for harbors and rivers:—Beaumaris, construction of wharf (revote), $20,000; Beaverton harbor (improvements), $15,000; Belleville harbor (improvements), $50,000; Burlington, revetment wall, etc., $25,000; Cobourg, extension of west pier, $25,000; Collingwood harbor (improvements) $75,000; Goderich harbor (improvements) $50,000; Hamilton, harbor (improvements), $200,000; Kincardine, harbor at north end of north pier, $10,000; Kingston, harbor (improvements), $100,000; Orilla, wharf, $4,000; Owen Sound (improvements), $25,000; Parry Sound, wharf, $25,000; Picnic Islands (improvements to channel), $100,000; Picton, harbor (dredging), $19,000; Port Burwell (improvements to harbor work, $50,000; Port Stanley, harbor (improvements), $50,000; Rainy River (improvements), $60,000; Sault Ste. Marie, harbor (improvements), $150,000; Telegraph and Nigger Islands (dredging), $40,000; Thornbury harbor (improvements), $29,000; Toronto, harbor (improvements—further amount required), $17,000; Whitby, harbor (improvements), $20,000.

Montreal, Que.—"The National Syndicate of Steamer Captains," a mutual benefit association, has just been incorporated with head office in Montreal. The officers are:—President, Capt. A. Labelle; vice-presidents, Captains R. Renaud and F. X. Laviolette; secretary-treasurer, Capt. George Lacouture; corresponding secretary, Capt. S. A. Labelle. The office of the society is at 239 Beaudry St.

Montreal, Que.—That Lloyds will not reduce the insurance rates on boats using the St. Lawrence is the word brought back by Mr. John Corbett, insurance broker of Montreal. Mr. Corbett went purposely to England to interview the executive of Lloyds to see whether some reduction in rates could be obtained, and the port of Montreal be placed on a footing in proximity to New York and Boston, where the insurance rates are less than one-half the year round what they are in the St. Lawrence in midsummer. "Little or no encouragement was given me at Lloyds," said Mr. Corbett. "I was told that there was no likelihood of any reduction at the present time, although the work of the Canadian Government, both past and projected, in improving the navigation of the St. Lawrence route was much appreciated. While over at Lloyds the question of disposing of the Levis wrecking plant came up for discussion, and I was told categorically that if the outfit was removed from the St. Lawrence, the rates would go up immedi-

ately. I hope that the Government will see the seriousness of the situation, for any further increase of rates would be a serious blow to the St. Lawrence."

Montreal, Que.—Local grain men are indignant over the announcement by the harbor commissioners that rates for use of the grain elevator under their control will be raised to 1 6-10 cents per bushel as against 9-10 of a cent per bushel in Boston and New York, which was also the old price here.

Sault Ste. Marie, Ont.—From Sault Ste. Marie comes the important announcement that the charter of the Sault Dry Dock & Shipbuilding Co. has been acquired by Mr. Clergue, and French and Belgian associates. The construction of the proposed dry dock will be commenced at once. It is understood that the new interests are planning the erection of a much larger plant than was formerly intended.

Kingston, Ont.—It seems pretty certain that the Canadian Northern Railway Company will shortly take over the business of the Rideau Lakes Navigation Co. of Kingston, which runs two steamers between this port and Ottawa. Two additional steamers may be built for the line. The railway company contemplates building two small hotels on the Rideau Lakes.

Lake Ontario Steamer Service.—The Macassa, which has been painted the Niagara Navigation colors, will be the first of this company's steamers to go into service this spring; it being the company's intention to run her as soon as the ice in Toronto and Hamilton Bays has broken up. The Modjeska and the Turbinia, it is expected, will not be put in service until Victoria Day. The first boat to run to Lewiston this season will be the Corona of the Niagara Line. She will be put in service about the middle of next month. The Chicora will commence running to Olcott Beach early in June. It is the intention to have the Chicora land her passengers at the Scott Street slip. The Hamilton steamers will come in at the new Yonge Street wharf of the Niagara Line and the Lewiston steamers at the same dock as last year.

Montreal, P.Q.—The Richelieu & Ontario Navigation Company are about to try the experiment of burning oil on their steamers. The Rapids Prince and Rapids Queen, on the Prescott-Montreal division, will abandon the use of coal for the generation of steam. While the question of economy is largely problematical, it is expected by the Richelieu officials that the saving effected by a reduction of the crew necessary to look after the oil-burning equipment will be considerable, while the absence of smoke and dirt should appeal to the passengers traveling on the line between here and Prescott.

Prince Rupert, B.C.—An agreement has been made between the Grant Trunk Pacific Railway and the Dominion Government for the construction of a floating dry dock at Prince Rupert, B.C., to cost approximately $2,200,000, and instructions have been given to proceed with the work. The construction of the dry dock is in charge of the Grand Trunk Pacific engineer, Wm. T. Donnelly, who has drawn the plans and specifications and who will be in charge of the work.

Toronto Bay Ice Records.—The following are the dates on which the ice formed and left the harbor for the past 12 years:—

Year.	Frozen.	Clear.	Days
1900-01	Dec. 14	April 6	113
1901-02	Dec. 16	Mar. 20	104
1902-03	Dec. 15	Mar. 15	90
1903-04	Dec. 14	April 22	130
1904-05	Dec. 11	April 5	115
1905-6	Jan. 8 '06	April 1	82
1906-7	Dec. 8 '06	Mar. 28	110
1907-8	Jan. 28 '08	Mar. 29	61
1908-09	Jan. 7	Mar. 31	83
1909-10	Dec. 29	Mar. 20	81
1910-11	Dec. 10	Mar. 31	91
1911-2	Jan. 6		

Winnipeg.—A prominent feature of the extensive works the Canadian Pacific contemplate starting next fall at Springfield and Kildonan will be the erection of a huge elevator. This elevator will be built to relieve congestion in the yards as well as overcrowding at the head of the lakes. It will be one of the largest in the West, and its provision will enable the company to utilize the cars thus relieved for handling the Western grain traffic.

Montreal.—The Allan Line have been awarded a renewal of the contract for carrying mails between Canada and Great Britain. The new contract, however, is only of a temporary character, and will not extend beyond May 1, 1913. The Government subsidy of $600,000 remains the same, and the Allan Company proposes to continue for the next year its arrangement with the Canadian Pacific Railway Company, whereby the latter's ships participate in the service.

London.—Lloyd's record of British shipbuilding gives 545 vessels, excluding warships, under construction in March, with a gross tonnage of 1,686,898, the highest ever recorded.

Ottawa.—Tenders for the construction of the New Welland Canal will likely be called for in June, and about two months given to contractors to submit their bids, so that autumn should see the start of actual operations. On the strength of the vote of $200,000 in the supplementary estimates, the department is issuing instructions for the preparations of detailed plans and specifications. This will necessitate further borings and test pits. As previously stated, the Ten Mile Creek route will be followed. The work is estimated to cost $45,000,000, and probably ten millions will be appropriated in next year's estimates. The amount voted last week will suffice for any work that can be carried on this season.

Vancouver.—The North Shore plant, established a couple of years ago by McDougall-Jenkins Engineers, Ltd., and which some time in October last passed into the control of Mr. Carter-Cotton anl other shareholders, will hereafter be operated under the title "North Shore Iron Works, Limited." When the former principals retired E. V. Young, who had gained his experience at the Westinghouse shops, Pittsburg, New York and London, Eng., was made business manager, and Wm. C. Shaw was given the position of engineering manager; Mr. Cotton being president of the board of directors. The increased earnings have justified the addition of a new machine shop, foundry and pattern shop, which give the plant facilities for executing a large variety of work. Of late the plant has been busy on six steel oil tanks for the ferry steamers at Vancouver; three tanks for the tug LeRoy; two tanks for the steamer Skeena; three tanks for the tug St. Clair; and ten air tanks for a Vancouver supply firm, in addition to turning out several large steam boilers and a lot of miscellaneous contract work. Now that North Vancouver is promised several railways, the North Shore Iron Works, Ltd., should have an assured and prosperous future.

Ottawa.—Plans prepared by Commander Thompson, of the Marine Service, for the life-saving station at Toronto Island, provides for moving the boathouse to the east end at a cost of $500, the erection of a dwelling and tower costing $4,000, purchase of a Lyle gun for protecting life lines, $700, establishment of a crew of ten men, including captain and mate, annual cost, $8,658; and the purchase of a 35-foot motor boat, with a speed of 24 knots, $3,000. It is proposed that the department should make the original outlay while the city wodld provide the maintenance.

Lifeboat Disengaging Gear.—An order has been placed with Messrs. H. C. Grayson (Limited), of Liverpool, to supply McKay's patent "boat disengaging gear," of which they are the sole makers, to the lifeboats of the two new steamers of the Canadian Pacific Company, now being built at the yards of the Fairfield Shipbuilding and Engineering Company, Govan.

Ambrose Channel ninety-three per cent. complete.—For a width of 1,200 feet the Ambrose Channel now has a depth of 40 feet at mean low water, for over 3½ miles of its length, and it has the same depth for a width of 1,800 to 1,900 feet over its other 3½ miles of length. The rest of the full width of 2,000 feet is from 35 to 40 feet deep.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals who Have Been More or Less Prominent in the Marine Sphere

Steamboat Inspector William Evans is out on his spring tour of inspection.

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Atlantic Mail Subsidy.—It is probable that the contract which now exists for the Atlantic mail service will be extended for a year to give the Dominion Government time to negotiate for and plan improvements.

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Captain James McMaugh will, it is understood, succeed Captain Charles Moller as examiner of masters and mates in the Toronto district. Local marine men, in discussing the matter, say that there could be no better appointment made, Mr. McMaugh being one of the most capable mariners on inland waters.

• • •

Wm. Tate Robertson, one of the pioneer captains of the upper lakes, died at his residence, Third Avenue East, Owen Sound, on March 17. For some time he has been in poor health and gave up active work on the lakes about ten years ago. Since then he has been until the appointment of the American Consul here, Deputy American Consul. For the past three years he has been Harbormaster.

• • •

Mr. James W. Woodward, formerly engineer of the steamer Corona, has been appointed chief engineer of the Niagara Navigation Company. He succeeds Mr. George M. Arnold, who for many years was engineer of the Niagara Line, and who has recently been appointed Government inspector of boilers.

• • •

Rear Admiral George Wallace Melville, who was for 16 years chief of the bureau of steam engineering of the United States navy, died at his home at Philadelphia, of paralysis, on March 17, at the age of 72 years. He was one of the most noted figures in engineering and naval circles in the world and was a most prolific writer upon engineering topics. He entered the navy department in 1861 as assistant engineer. One of his most prominent assignments was to go to the relief of the Greely expedition and his work upon this occasion will always be a conspicuous part of arctic history. No man in his profession was more honored than Melville. Since his retirement from the navy department he had engaged in general engineering practice with John H. Macalpine, in Philadelphia. He was past president of both the American Society of Mechanical Engineers and the American Society of Naval Engineers.

• • •

John S. Metcalf, president of the John S. Metcalf Co., Ltd., died recently at his home in Evanston, Ill., after an illness extending over some months. Mr. Metcalf had devoted his life to the designing and construction of large grain elevators, and was universally recognized as having attained the leading position in his profession. Many of the largest terminal elevators in Canada were his work, among which may be mentioned the Grand Trunk elevator at Windmill Point, the harbor commissioners' conveyor system, and the harbor commissioners' elevator No. 2 now under construction at Montreal. He was born near Sherbrooke, P.Q., in 1847, but when a young man left Canada for the United States. Of recent years he has spent much of his time in his native country.

* * *

Seamen's Wages—The average monthly rates of wages paid to seamen engaged on sailing vessels at Sydney, Australia, are:—To Great Britain and other European countries, $19.44 to $21.82; west coast of America, $19 to $22; island trade and return, $24 to $30; interstate trade, $22 to $25 (steamships, $34.02); coast trade, $24 to 32 (steamships $34 to $39). The wages paid to those on steam vessels engaged in the interstate trade are:—Engineers, $58 to $140; firemen, $44 to $48; trimmers, $20 to $38; and to those in the foreign trade:—Able seamen, $20 to $34; firemen, $22 to $44, and trimmers, $20 to $34.

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GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.

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President—A. A. Heard, Albany, N.Y.
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President—A. A. Allan, Montreal; Manager and Secretary—T. Robb, 526 Board of Trade, Montreal.

SHIP MASTERS' ASSOCIATION OF CANADA.

Grand Master—Capt. J. H. McMaugh, Toronto, Ont.; Grand Secretary-Treasurer—Capt. H. O. Jackson, 376 Huron St., Toronto.

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Richard McLaren, Owen Sound, Ont.
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Levis	8	Michael Latulippe	Lauzon	Jules Lecours	Bienville, Levis, P.Q.
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Owen Sound	10	Russel R. Foote	Box 657	E. J. Riley	1030 1st Ave., Owen Sound, Ont.
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Midland	12	Arthur Abby	Midland	Jno. A. Murphy	Midland, Ont.
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Sault S Marie	14	Thos. O'Reilly	Sault Ste. Marie	Geo. S. Biggar	Sault Ste. Marie, Ont.
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LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main St., Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava St., Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy St., Kingston, Ont.; Captain James H. Martin, 259 Johnston St., Kingston, Ont.; John Corkey, 17 Rideau St., Kingston, Ont.; Captain Daniel H. Mills, 272 University Ave., Kingston, Ont.

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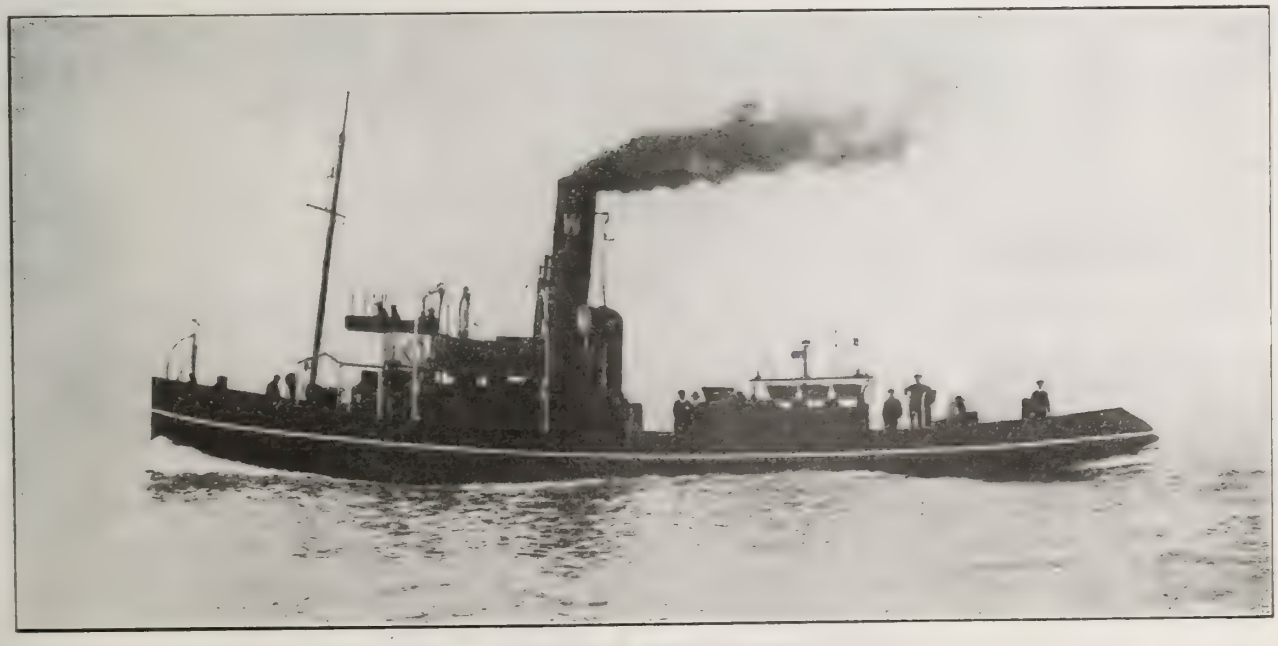
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"Pioneers in the Packing Business."

SCREW TUG "LADY INCHCAPE."

IN our March issue we gave some particulars of the voyage of the screw tug "Lady Inchcape" from the Clyde to Ceylon. As a supplement to that narrative, the accompanying illustration and particulars relating to the purpose, design and constructional features of the little vessel will not be without interest.

She was designed and built for the Ceylon Wharfage Company. While primarily intended for the service of the War office, she has been arranged so as to be used both as a tender and as an ordinary deep sea tug. The principal dimensions are: Length between perpendiculars, 90 feet; breadth moulded, 18 feet 11¾ inches; depth moulded, 9 feet. In the forward end of the vessel there is a saloon, plainly but tastefully fitted up for use of passengers when the vessel is acting as a tender. Abaft this is accommodation for the captain and engineer. At the after end of vessel is the crew's accommodation. On the main deck forward there is a powerful windlass and towing post, a mast with sig-



Screw Tug "Lady Inchcape."

nalling yard, and arrangements for carrying the various night lights, while companions are provided to the accommodation below.

The towing equipment consists of a large tripping spring hook which is swivelled amidships, thus enabling the vessel to be turned in any direction, even when there is a pull on the tow rope. There is also provided a special winding engine for towing targets, and an observation deck with semaphore and recorder, all of which can be removed when not required. The hull is protected by a heavy belting running fore and aft and specially reinforced amidships.

The propelling machinery consists of a set of compound surface condensing engines supplied with steam by a large Scotch boiler; the installation being provided by Messrs. Mackie & Baxter, of Govan, Scotland.

A CONCRETE LIGHTHOUSE.

A reinforced concrete lighthouse on a concrete crib foundation has been recently completed at Huntington Bay, N. Y. The structure is located on a bar at the entrance to Lloyd's Harbor, on the south shore of Long Island Sound, and is equipped with a revolving light. The foundation is a reinforced concrete crib 26 ft. by 30 ft. in section and 16 ft. deep. This crib is protected by rip-rap and carries a concrete deck on which the superstructure is built. The building is of the ordinary pilaster construction, with intermediate wall slabs, and contains the living quarters for the lighthouse-keeper. It is covered with a flat roof, around which is placed a concrete parapet wall. The light tower, although an integral part of the building, is built monolithically, and has a square exterior measuring 10 ft. on a side, with a circular interior 8 ft. 4 in. in diameter. The light chamber and the frame of the light are built up of structural steel securely anchored to the concrete. The focal plane of the light is about 51 ft. above mean low water.

Considerable attention was paid to the surfacing of the concrete in the structure. The pilasters were washed and polished, and in the slabs between them the aggregate was exposed first by a pneumatic tool, then by a bush hammer, and subsequently washed with muriatic acid. A 1 : 2 : 4 concrete mixture was used on the work. No provision was made for water-proofing the walls at the time the concrete was put in, but as they were found to be pervious to the driving rains and the spray of severe storms they were treated with a water-proofing compound.

The exposed situation and the strong tidal currents greatly increased the difficulties of construction. In this work a timber platform 30 ft. by 40 ft. in area was built and anchored with timber piles and the material was handled in lighters moored to this dock, while the concrete plant was also placed on a lighter. In building the forms at each 6 ft. stage, a runway was erected entirely round the structure. Concrete was mixed in a Ransome mixer, loaded into wheel-barrows, and hoisted to the runway in a sling by a derrick.

NAVIGATION OPENS AT TORONTO.

The steamer Dalhousie City made her way into port on April 10, from Port Dalhousie, and was a given a hearty reception by the other craft that could furnish enough steam to toot their whistles. Captain Maddock, who was in command wins the Harbormaster's hat.

In order to reach the steamer's berth Captain Maddock had to bring the vessel from the western channel close to the docks and when opposite Yonge street change his course out into the bay so that he might make the slip. When he reached this he had to crush into about 9 inches of ice before he could make fast. Speaking of the trip over, Captain Maddock said: "It was a little cold but there was no ice. We encountered a lot of driftwood and shanties that had slipped away from the mouth of the Credit River.

"We cast off our lines at Port Dalhousie at 9.45 a.m., and made fast just as 'Big Ben' struck the noon hour." The first steamer to arrive last year was the steamer Macassa, on March 30th, when Captain Henderson won the hat.

The Dalhousie City looks to be in splendid shape and fit for a big season's work. The raising of her anchors from the water line to the main deck adds much to the steamer's appearance.

The Macassa is ready to sail for Hamilton. "We are just waiting for the ice to leave Burlington Bay," said Capt. Henderson. Ferry Manager Solman is anxious to make a start with his regular fleet to the Island, and will do so the minute the ice leaves the north side of the Island shore.

Fort William, Ont.—It was only last Fall that the Fort William Coal Dock Company completed an addition to its holdings on the Mission River, which doubled the capacity of the dock, and placed the coal handling plant in the forefront of the electrically operated systems on the lakes. Yet again, is the company out for expansion that will triple the capacity of the present plant by September 1 next. In the latest Government Gazette to hand is an announcement that the company is increasing its capital from $200,000 to $500,000, and this is the provision for the new work. There will be an addition to the power house in generators; the dock will be carried back another 110 feet, while the frontage of the property for storage purposes will be extended another 160 feet. One of the largest Brown hoists extant, carrying six-ton buckets, will be added to the present equipment, and the whole, the new and the present installation, will be one complete unit. At present there is storage capacity for 100,000 tons, and the addition will allow of 400,000 tons altogether.

Ottawa.—The Public Works Department will spend $195,000 this summer in constructing a revetment wall in Toronto harbor, six feet above the water level to protect the reclaimed land made by the new western entrance.

Steamship Sale.—The steamers Acadian and Canadian, of the Mutual S.S. Co., have been sold to the Canadian Inter-lake Line.

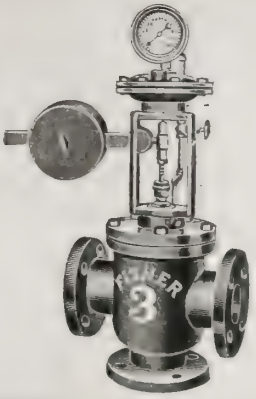
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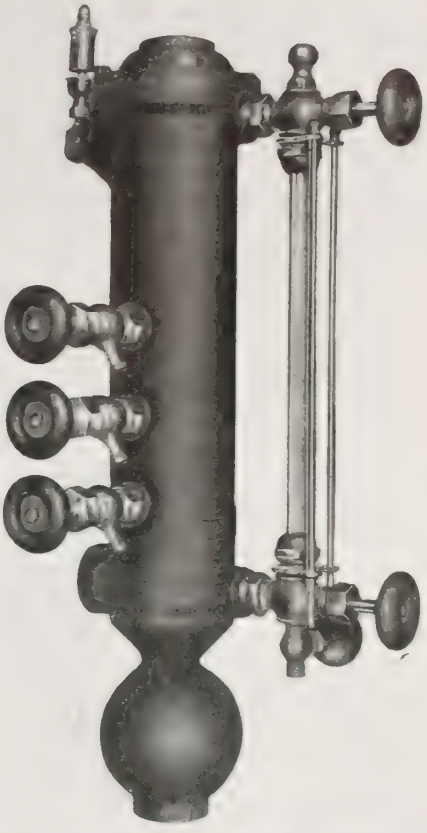
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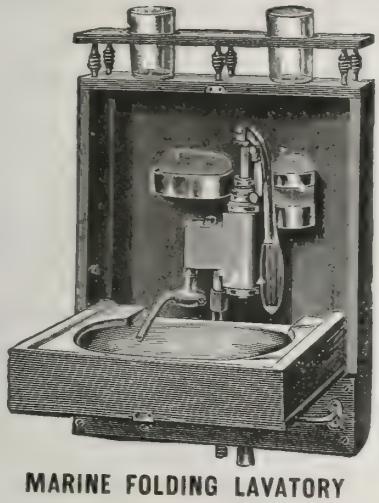
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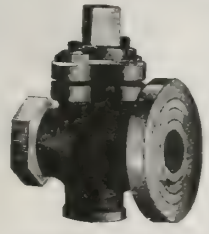
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MARINE POP SAFETY VALVE
Twin type to conform with Government regulations.



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Made flanged, both ends, screwed and flanged, and screwed both ends.



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We shall be pleased to receive your enquiries for anything in these lines. All our goods are of substantial design to stand the strain under which Marine goods are frequently subjected.

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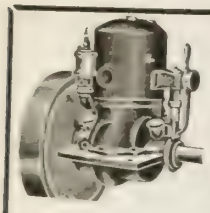
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We use the oxy-acetylene process.

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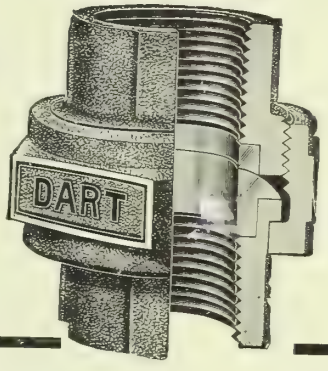
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Vol. II. Publication Office, Toronto—May, 1912. No. 5

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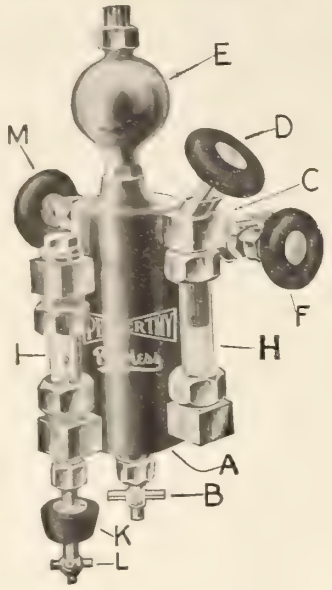


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The filler opening is lipped shaped, permitting use of oil can with large spout, saving both time and oil when filling; no need to use a funnel. The oil regulating valve and drain valve are combined in one, but operate entirely independent of each other. The drain valve is underneath and allows drainage to flow directly down. Prevents same from spattering over regulating valve and enables engineer to keep Lubricator clean and neat at all times. The Lubricator can be attached or removed at any time without letting down steam, for this reason:—The part containing the globe valve F is first screwed into steam pipe and the Lubricator is then coupled to it. It is only necessary, therefore, to close globe valve F and uncouple Lubricator from it. The sight-feed glass is inserted through the top; the gage glass by inserting from the side.

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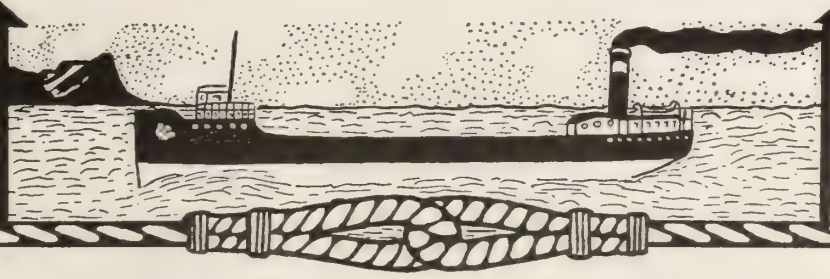
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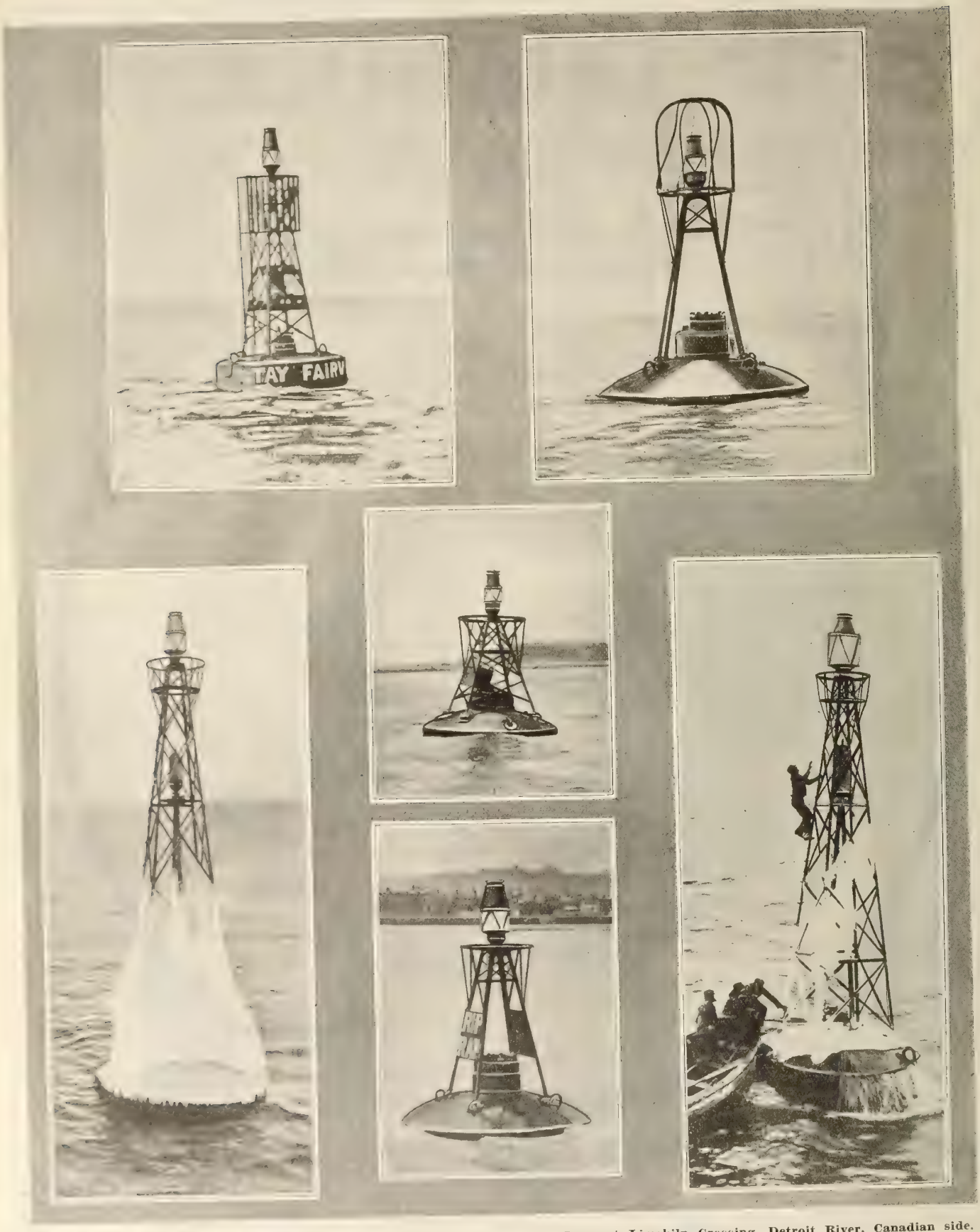
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Tay Fairway Buoy, Dundee, Scotland.

No. 9½ Gas and Whistling Buoy, off Egg Island, Nova Scotia.

No. 8C. Buoy in Harbor of St. John, New Brunswick, where the tide goes in and out at the rate of 7 knots per hour four times a day.

Rip Rap Buoy, in the Mersey, England.

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Gas and Whistling Buoy—known in marine circles as the "Outer Automatic."—Halifax, Nova Scotia

INTERNATIONAL MARINE SIGNAL

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Gas and Whistling Buoy at Mouth of the Amazon River, Brazil.

Buoy being towed to position at Aden.

No. 7½ Beacon on screw piles in Lagoa Mirim, Rio Grande do Sul, Brazil.

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THE WORLD'S LARGEST LINER

S.S. "IMPERATOR" 50,000 Tons.

THE WORLD'S RECORD ANTI-CORROSIVES.



SPECIFY AND INSIST ON GETTING BRIGGS'.

The entire interior surfaces of the Enormous Bunkers Coated with **BRIGGS'** Bituminous

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WM. BRIGGS & SONS, Ltd., Dundee & London.

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MACDONALD & SONS, 176 King St. East, TORONTO.

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SOLUTION ENAMEL

A permanent protection from corrosion for all iron and steel structural work—in air or water.

Applied like paint—elastic and withstands heat and cold.

Used by the chief corporations, principal shipbuilders, engineers and structural steel workers in Great Britain.

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Cracks and corrosions in boilers a specialty.

We use the oxy-acetylene process.

Expert workmanship.

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When Fitting Out

for this season's operations, the idea should be to make your plant as

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as possible in every particular. Install a boiler feed which is an absolute controller at all times, and you have a

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Consulting Engineers and Contractors for

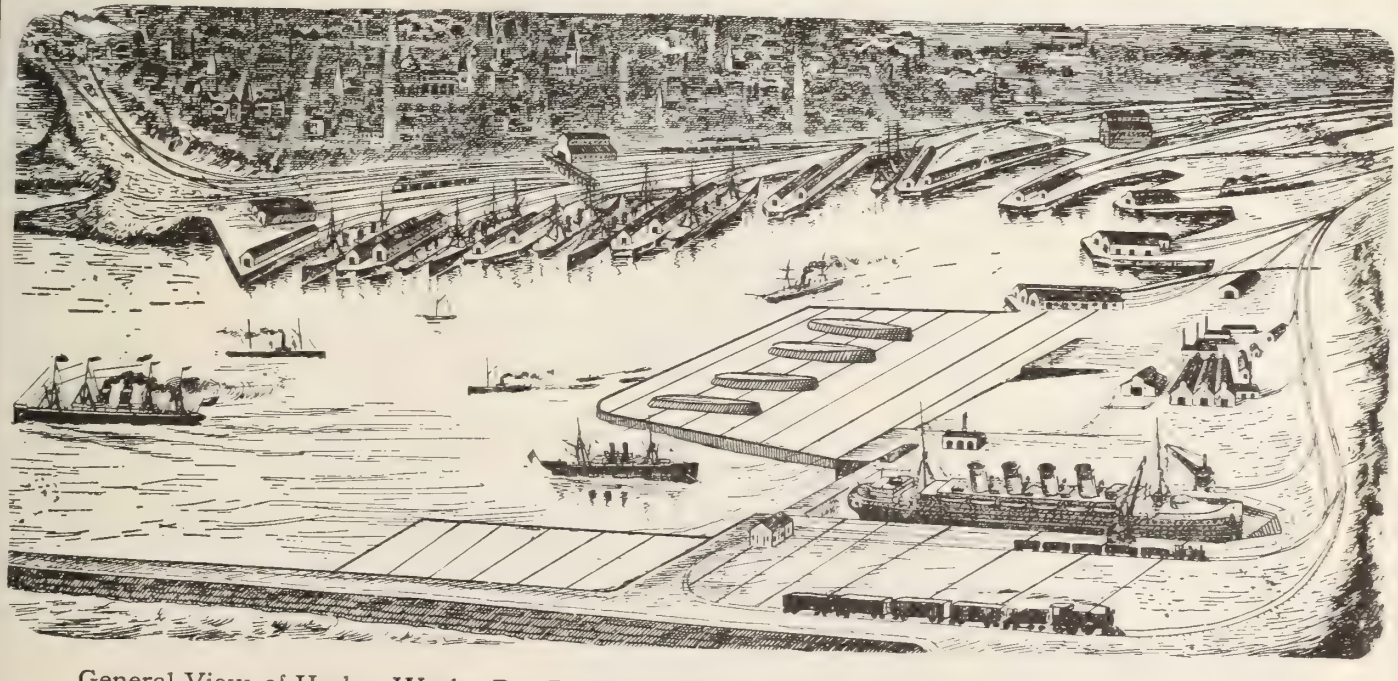
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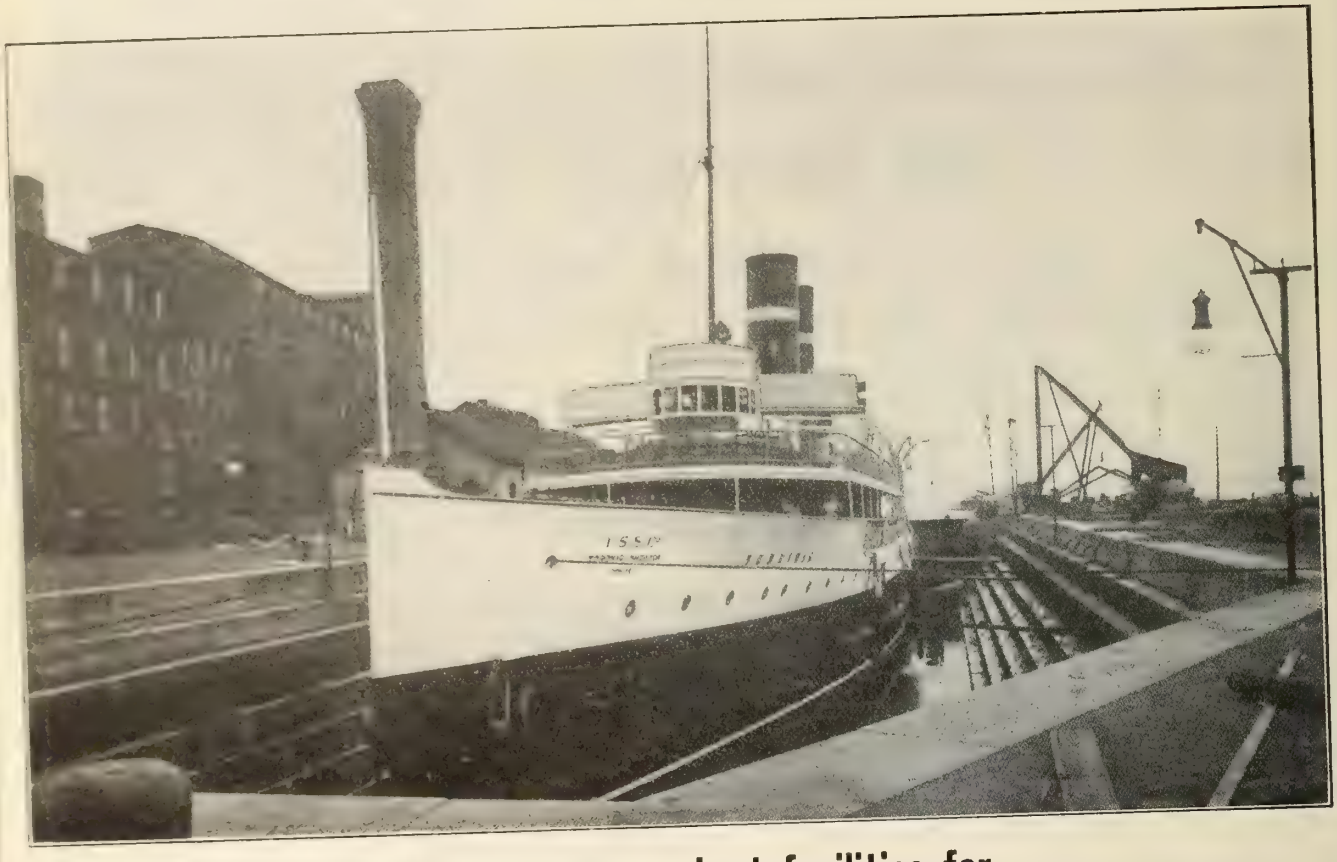
Construction Work undertaken and completed by this firm comprises some of the most important railway—dock—and sewer contracts in the world—are constructing the harbor work at St. John, N.B., the largest contract of its kind ever given in Canada.

The Head Office of the Company is in Vancouver, B.C., which is also the Head Office of the Norton Griffiths Steel Construction Company, who are erecting some of the largest steel and ferro-concrete buildings in that city and other works on the west coast. The sketch below gives a general idea of the scope of the works at St. John, N.B.



General View of Harbor Works, Dry Dock and Ship Repairing Yard, Courtenay Bay, St. John, N.B.

Steel and Wooden Shipbuilders
Dry Dock Operators



We have the very best facilities for

SHIP REPAIRS

Plant fully equipped for work by day or night.

Steel Structural Work

Our prices are right. Our expert engineers are at your service and will quote you estimates on any work in this line.

Write us at once.

Stone Dry Dock

323 feet long.
55 feet width at gate.
16 feet water over sill.

Kingston Shipbuilding Company, Limited

KINGSTON, ONT.

S. DYMENT, President — J. F. McMILLAN, Treasurer — H. A. CALVIN, Vice-President
JOHN McINTYRE, Superintendent — W. J. FAIR, Secretary

The advertiser would like to know where you saw his advertisement—tell him.

Launch of the Dominion Government Steamer "Estevan."

By Helenslee.

The efforts being put forth by the Federal Government of Canada to improve and develop her maritime interests on both Lake and Seaboard are such as to ensure the commendation of every true citizen of this Dominion and subject of a Great Empire. The stimulus being given to shipbuilding and marine engineering, and the protection being afforded, as a result, to our commerce and shipping will contribute largely to national prosperity.

THE launch of the Dominion Government steel twin screw lighthouse tender and buoy steamer Estevan, took place on Tuesday, April 30, from the yard of the Collingwood Shipbuilding Co., Collingwood, Ont. The vessel has been under construction since last fall, work having been carried on to a considerable extent during the winter despite a long spell of weather highly unfavorable to rapid outside shipbuilding progress.

Vessel Features.

The Estevan is built of steel throughout and has a double bottom running her entire length, for water ballast, strength and safety purposes. The principal dimensions of the vessel are:—Length, 212 ft. over all; breadth moulded, 38 ft.; depth moulded to main deck, 17 ft. 6 inches; deadweight, 375 tons; mean load draft, 11 ft. 6 inches; bunker capacity, 260 tons of coal, and speed 12 knots. A straight stem, elliptical stern and seven watertight bulkheads are other hull features. The officers' quarters are well arranged and beautifully finished in oak and yellow pine with decorated ceilings, and where necessary, tiled floors are laid. The furniture is mahogany and the armchairs and sofas are upholstered in leather.

The propelling machinery consists of two sets of inverted, vertical, direct acting, triple expansion, surface condensing engines with cylinders, 15, 25, 42 inches diameter by 26 inches stroke, which are supplied with steam by two Scotch marine type boilers, each 14 ft. diameter by 10 ft, 6 inches long, at a working pressure of 180 lbs. per square inch. Howden's system of forced draft is installed.



MISS HELEN CURRIE.
Who christened the Dominion Government steamer "Estevan."

The vessel is electric lighted throughout, and is equipped with steam steering gear, winches and windlass of the latest design. The engine and boiler room are furnished with the necessary auxiliary equipment of pumps for condensing, fire, ballast, boiler feed, bilge and wash deck purposes.

Launching Ceremony.

At the launch a distinguished party occupied the stand, there being present among others, Hon. J. D. Hazen, Minister of Marine and Fisheries, and Miss Hazen; Hon. T. W. Crothers, Minister of Labor; Major J. A. Currie, M.P., and Mrs. Currie; Mr. Alex. Johnston, Deputy Minister of Marine and Fisheries; Mr. Thomas Long, vice-president of the Collingwood Shipbuilding Co., also Miss Helen Currie, daughter of Major J. A. Currie, who had the honor of perform-



Dominion Government Steamer "Estevan" on the Stocks Before Launching.

ing the christening, a ceremony which the young lady performed with grace and tact.

Work on the Estevan is well advanced, a considerable quantity of her interior



Launch of the Dominion Government Steamer "Estevan."

equipment and furnishing having been installed previous to launching. It is, therefore, expected that the vessel will shortly leave on her long trip around the Horn to the Pacific Coast, where it will go into commission, with headquarters at Victoria, B.C.

MARINE AND FISHERIES DEPARTMENT POLICY.

SPEAKING at the banquet tendered the guests present at the launch of the Dominion Government steamer Estevan by the City Council and Board of Trade of Collingwood on Tuesday, April 30, the Hon. J. D. Hazen, Minister of Marine and Fisheries, pointed out that Canada was, meantime, prosperous beyond measure; for while in 1868 her foreign trade amounted to 131 millions, in 1911 it had reached 769 millions, and confident expectation placed the figures for the present year in the vicinity of 800 millions value. Notwithstanding that the foreign trade was growing so extensively, interprovincial business was keeping pace; the east doing business with the west, a feature which he believed was sure to develop to a greater extent.

Marine Department Work.

Turning to the Marine Department, he stated that it was the intention to deepen and improve all harbors and channels, while the St. Lawrence which has been so great a factor in the development of Canada's transportation would be deepened below Montreal to a uniform depth of 35 feet. Throughout the lakes and rivers, navigation would be further aided by lighthouses and buoys and other marks that would be of advantage and of assistance to seamen.

Continuing, Mr. Hazen quoted statistics that showed the development of Canada's shipping; dealing specially with the figures of Ontario. He pointed out that on December 31st, 1910, there were 7,904 vessels with a tonnage of 750,929 net tons on Canada's register. In Ontario in 1906 there were 1,978 vessels with a net tonnage of 180,340 tons, while in 1910 this had been increased to 2,027 vessels with a net tonnage of 227,457 tons, giving employment to 10,934 men and boys. While these increases are exceedingly gratifying they

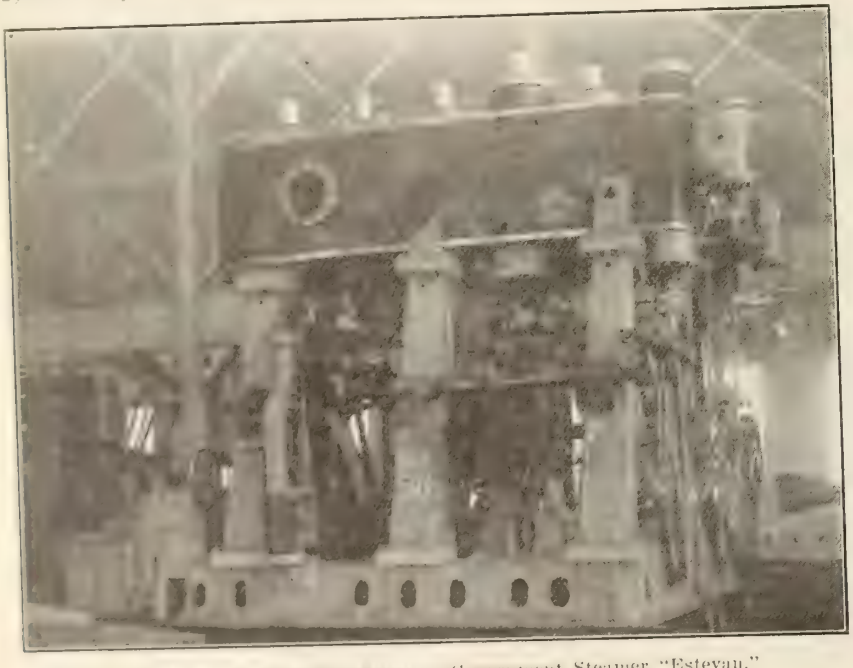


THE HON. J. D. HAZEN.

do not include the steamers of British register on the Great Lakes, of which there are at least 41 with a net tonnage of 48,973 tons, making the total for Ontario at the close of the last fiscal year of 2,068 vessels with 276,430 net tons and employing 12,091 men and boys. With the steady growth of the country the transportation facilities will necessarily have to be even greater, but the people of Canada will meet all demands and he assured the gathering that the Government will not be found wanting in giving assistance.

Canadian Fisheries.

The fisheries of Canada were also touched upon, figures being given to



Engines of the Dominion Government Steamer "Estevan."

show that efforts were being made to rehabitate the lakes by means of a series of fish hatcheries. At the recent session of Parliament provision was made for seven fish hatcheries to be distributed throughout the Dominion. One of these would be located at Collingwood for the purpose of replenishing the stock of fish in the Georgian Bay.

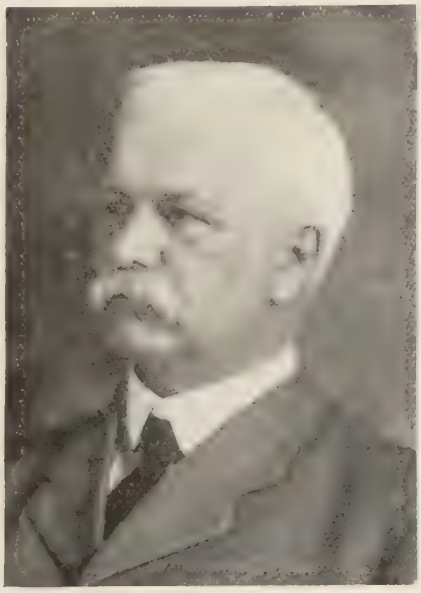
He said that where fish propagation had been successfully carried on, the depletion of the waters had not been nearly so marked. He regretted that the treaty prepared by the International Fish Commission had not been agreed to by the neighboring Republic and stated that unless action was soon taken on the part of that country, Canada would of necessity be obliged to take such steps as would be deemed adequate to protect the commercial interests of the Canadian fisheries.

CHIEF ENGINEER, THE DEPARTMENT OF MARINE AND FISHERIES.

LIEUT.-COL. William Patrick Anderson, M. Inst. C.E., Past President Can. Soc. C.E., F.R.G.S., Chief Engineer of the Department of Marine and Fisheries of the Dominion Government, was born at Levis, Que., September 4, 1851, and was educated at Bishop's College, Lennoxville and Manitoba College. He entered the civil service as assistant engineer of the Marine Department in October, 1874, and was promoted to his present position in February, 1880. His duties embrace most of the technical work in his department, including the construction of lighthouses, lightships, fog alarms, buoys and beacons; supervision of construction and repairs to lifeboats; the administration of the vote for the removal of wrecks and obstructions in navigable waters; engineering points in connection with the construction and maintenance of fish passes; supervision of surveys for oyster beds; examination of applications for foreshore, wharf and water lots as they affect the interests of navigation; preparation and publication of notices to mariners and hydrographic notes.

Record of Achievement.

During the thirty-two years that Col. Anderson has occupied his present position, he has designed and erected over 600 lighthouses and 100 fog alarm stations. The following constitute a few of his engineering achievements: A complete hydrographic survey of the Bay of Quinte; construction of a lighthouse on a caisson foundation in 13 ft. of water on Colchester Reef and another in 14 ft. of water in Pelee Passage, Lake Erie, fireproof throughout; the building of a permanent lighthouse in the traverse of St. Roch in 42 ft. of water and a tideway of over 7 knots; the installation of a first-order siren, worked by compressed air, on Belle Isle, with power obtained from the lakes on the hills; and the building of a large number of reinforced concrete cast iron, and steel lighthouse towers.



LIEUT.-COL. W. P. ANDERSON, OTTAWA
Chief Engineer Department of Marine and Fisheries.

Military Career.

Col. Anderson is a member of council and executive committee of the Dominion Rifle Association and is a well-known rifle shot, having represented Canada as a member, and later as commandant of the Bisley team. In 1900 he won the Governor-General's match, the big prize of the Dominion meeting. In 1885 he established the Canadian Militia Gazette and edited it for two years.

He is a charter member of the Canadian Society of Civil Engineers; having been one of the committee to draft its constitution. He commanded the Forty-Third Battalion, Ottawa and Carleton Rifles up to January, 1892, when he was placed on the retired list. He has been Chairman of the Public School Board of Ottawa and is now Chairman of the Geographic Board of Canada. At the 12th International Congress of Navigation being held in Philadelphia in the latter part of the present month, he will be a worthy and qualified representative of the Dominion. We are indebted to the Hugh C. MacLean Co. Publication, the "Contract Record" for the cut and detail sketch of Lieut.-Col. Anderson.

SHIPBUILDING AT COLLINGWOOD, ONT.

MR. THOMAS LONG, vice-president of the Collingwood Shipbuilding Co., speaking at the banquet, succeeding the launch of the steamer Estevan at Collingwood recently, reviewed the rise and development of the shipbuilding industry in that city.

Personal Paragraph.

Mr. Long, who, by the way, is a native of Ireland, having been born there in 1840, came to Canada in 1850. After serving an apprenticeship to the general commercial business, he started on his own account in Collingwood during the year 1858. Since 1866 he has been engaged in transportation on the Great Lakes, and in 1887 he took a hand in shipbuilding and drydock enterprises, in each of which spheres he is still actively interested. In addition, Mr. Long is connected prominently with many leading and prosperous financial and industrial institutions.



The Pioneer Atlantic Liner "Sirius" Approaching New York from Queenstown, Ireland. April, 1838.

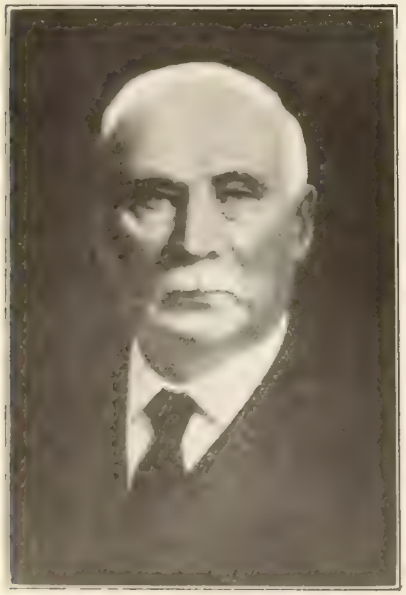
Shipbuilding Progress.

Speaking of the rise of the shipbuilding industry at Collingwood, Mr. Long states that his company first gave their attention to wooden vessels, but in 1900, a change was made to steel construction, since which time advances have been very rapid. As the trade increased, the requirements of the shipyard became correspondingly greater, and the first dry dock becoming too small, a second dry dock was constructed.

To assist in the expansion of the business, the town of Collingwood generously voted a bonus of $50,000, while the Dominion Government by subsidies to the dry docks also lent a helping hand. Since the change from wood, the number of steel bottoms on the lakes had increased to 110, of which but 25 were built in Canada. Of the latter number, 18 are the product of the past year, and, needless to say, they are equal to anything on the lakes in construction, equipment and design.

Canadian Shipbuilding Difficulties.

The industry has now developed until the pay roll amounted to an average of $19,000 each fortnight, yet in spite of the progress that has been made, the Shipbuilding Company still required assistance on the part of the Government, and he urged that the orders of the various departments for ships be placed with Canadian yards. He pointed out the unequal competition of the British yards by the bringing in of British ships which do not contribute one cent to the revenue



Thomas Long, Esq., Vice-President the Collingwood Shipbuilding Co., Collingwood, Ont.

of the Dominion, and urged the Government to give the Canadian yards the necessary protection in this particular.

Mr. Long also referred to some of the difficulties under which the shipbuilding industry labors in Canada, among others, the practice of permitting old United States bottoms being brought into Canada at low valuation and without duty on repairs costing many thousands of dollars effected before the transfer of the hulls to the Canadian register.

OFFICERS' PAY ON LINERS.

THE Daily Mail's Liverpool correspondent furnishes the following list of the salaries paid to the captains and other officers employed by the great



The "Princess Patricia" Fitted Out for Her Voyage from the Clyde to Vancouver, B.C.

Atlantic shipping lines. Captain Smith, the commander of the Titanic, received $6,250 a year, but his salary was exceptionally large.

The following is a table of the salaries paid by some of the leading lines:—

White Star.

	Per annum.
Captains	$1,750 to $5,000
	Per month.
Chief officers	$70 to $100
Second officers	45 to 60
Third officers	45
Fourth officers	42.50

Cunard Line.

	Per annum.
Captains	$1,375 to $3,250
	Per month.
Chief officers	$80 to $110
Second officers	55 to 60
Fourth officers	40

P. and O.

	Per annum.
Captains	$2,000 to $4,500
	Per month.
Chief officers	$70 to $100
Second officers	50 to 65
Third officers	45
Fourth officers	35

CREW AND PASSENGERS OF THE "TITANIC"—OFFICIAL ANALYSIS.

THE President of the British Board of Trade has furnished the following information concerning the "Titanic's" complement of crew and passengers, showing the number, class, sex and percentage of those saved.

First Class Passengers.

		Saved.	Per cent. Saved.
Men carried	173	58	34
Women carried	144	139	97
Children carried	5	5	100
Total carried	322	202	63

Second Class Passengers.

		Saved.	Per cent. Saved.
Men carried	160	13	8
Women carried	93	78	84
Children carried	24	24	100
Total carried	277	115	42

Third Class Passengers.

		Saved.	Per cent. Saved.
Men carried	454	55	12
Women carried	179	98	55
Children carried	76	23	30
Total carried	709	176	25

Total Passengers.

		Saved.	Per cent. Saved.
Men carried	787	126	16
Women carried	416	315	76
Children carried	105	52	49
Total carried	1,308	493	38

Crew.

		Saved.	Per cent. Saved.
Men carried	875	189	22
Women carried	23	21	91
Total carried	898	210	23

Total Passengers and Crew.

		Saved.	Per cent. Saved.
Men carried	1662	315	19
Women carried	439	336	77
Children carried	105	52	49
Total complement.	2,206	703	32

MONTREAL DRY DOCK AND SHIP REPAIRING CO.

The Montreal Drydock and Ship Repairing Co., Ltd., has just been incorporated with a capital stock of $50,000. The officers are:—President, J. T. Walsh; vice-president, A. Larocque; sec.-treas., F. H. Fox; managing director, Thos. Hall.

The company have secured a ten-year lease of the Tate Dry Dock on the Lachine Canal. Repair work of all classes will be handled and the capacity is such than any lake steamer can be accommodated. Tugs, barges and smaller craft will also be built. The docking space is shaped like three sides of a square and a special gate is being built to cut off the main basin from the remaining space. A crane will be so placed on the central pier as to serve all the basins.

The Western Dry Dock & Shipbuilding Co., Port Arthur

By J. H. Williams

A description of the dry dock and shipbuilding equipment of a company who recently commenced operations, and are already obtaining a good share of orders. The plant forms one of Port Arthur's principal industries and gave steady employment to about 350 men throughout last winter.

WITH the establishment of the Western Dry Dock & Shipbuilding Co., Ltd., at Port Arthur, Ont., Canadian inland shipping has been supplied with one of its most pressing needs,—viz., dry dock accommodation at the head of Lake Superior. The company, which is an off-shoot of the American Shipbuilding Co., has a fully equipped shipbuilding and repairing plant of the most up-to-date description, and its organization is now complete,—in fact the first ship built in the yard is almost ready for launching.

The site occupied by the company's dock and shops has an area of about 100 acres, so that ample space is provided for future extensions when required.

The Dry Dock.

The dry-dock was completed at the end of November, 1910, and presents several features of interest. It was designed by Mr. A. V. Powell, of Chicago, and constructed by the Canadian Stewart Co., Ltd. Much thought was given to the question of its dimensions, with a view to providing for larger boats than those in common use on the Great Lakes at the present time. Finally, a length of 700 feet was decided upon. The largest lake freighters at present in use do not exceed 610 feet over all, and experts seem to be agreed that this length cannot be much increased, unless accompanied by an addition to the depth that would render such boats unable to use most of the existing harbors. However, a dock length of 700 feet allows for any freak boat that may be built in the future, and will also accommodate two vessels of a size in common use at present.

The dock is of solid concrete and rests upon a rock foundation. Fig. 5 shows a general view of it, while Figs. 2 and 3 show sections and plan respectively. From these it will be seen that the width at the top is 98 feet 8 inches, and that the depth of water over the portal sill is 16 feet. The gate or caisson is of steel, its leading dimensions being given in Fig. 4. It is fitted with five 30-inch flooding valves, and is emptied by a small steam pump situated in the interior above the flood line and provided with steam from a boiler on the dock side.

The dock itself is emptied by two 30-inch centrifugal pumps driven by 200 H.P. direct connected vertical motors. There is also an 8-inch pump of the same type, driven by a 30-H.P. motor; this takes care of the drainage. All three pumps were supplied by the John



Fig. 5—General View of Dock.



Fig. 1—Entrance to Dock. This photograph was taken before the shipbuilding gantry was erected.

Inglis Co., Toronto, while the motors are of Westinghouse make.

Building Berth.

There is at present one building berth situated on the west side of the dock. It is 700 feet long and is served by a 10-ton electric gantry crane supplied by the Wellman, Seaver & Morgan Co., of Cleveland, Ohio. The clearance from ground to underside of crane is 56 feet. On the west side, the gantry is of steel, while on the side next to the dock it is of timber construction to facilitate removal previous to launching—all boats being side launched into the dock. Compressed air headers run the full length of the building berth, the various pneumatic tools being coupled thereto by flexible connections in the usual way. Both sides of the dock are similarly equipped, as are also the various shops throughout the plant.

It is the intention in the near future to construct a second building berth on the opposite side of the dock.

Ship Construction Equipment.

The punch shed stands in line with and at the head of the dry dock. It is a steel frame building of two storeys, 250 feet long by 160 feet wide. A centre row of steel columns divides the lower floor into two bays, each of which is served by two Pawling and Harnischfeger 7-ton electric traveling cranes. The runways for these cranes extend out beyond the north end of the punch shed, so that they may handle material in the stock yard which is there located. The stock yard is also served by a standard gauge track; so that material passes from cars to punch shed and thence to the building berth with a minimum of handling. Generally speaking the plate work is all done in the west bay of the punch shed, while the east bay is given over to shapes. All machines are driven by individual motors. Those in the west bay include a 32-feet plate edge planer by the John Bertram & Sons Co., 16 feet heavy plates bending rolls by Wickes Bros., two wall radial drills, and eight punches and shears by the London Machine Tool Co., and Hilles & Jones. In the east bay are found the lighter punches and shears, and a bending machine for shapes, supplied by the John Bertram & Sons Co. The motors and gearing of all the punches, etc., are enclosed in substantial wooden housings, to which the motor controllers and switches are affixed. Each machine is served by a 3-ton bracket crane swung from the adjacent column. In annex at the north-east corner of the punch shed are housed the slabs and two flanging furnaces.

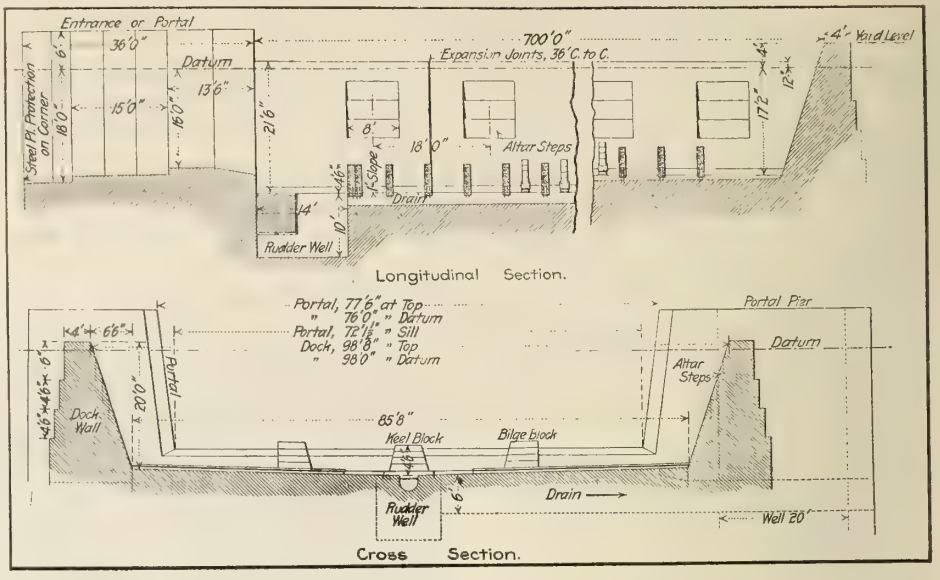


Fig. 2—Sections of Dock.

The mold loft is situated immediately above the punch shed and is of the same area as the latter. It is excellently lighted and contains the usual equipment for making the marking off templets.

The Boiler Shop.

This shop is well equipped with the most modern tools for the convenient and expeditious handling of boiler and tank work of every description. It is a self-supporting steel frame building with brick walls and a cinder floor, served by standard gauge tracks. The shop is 180 feet long by 90 feet wide and is divided into three bays, of which the centre one is used for assembling purposes, being served by a 20-ton electric traveling crane. All the machines have individual motor drives and are of the most modern construction. Amongst them are included two heavy punches (60-inch throat) and one 48-inch throat shear, by the London Machine Tool Co.; 36-inch throat punch, 18-inch throat shear and horizontal punch by Long and Allstater; one horizontal triple-head Dallett drill, each head being driven by individual motor; one Bertram 4-spindle drill; one radial wall drill and one fixed ditto for drilling large plates. Bolts, stays, etc., are screwed either on an Acme double-head 2-inch bolt cutter or on a 4-inch machine of the same make.

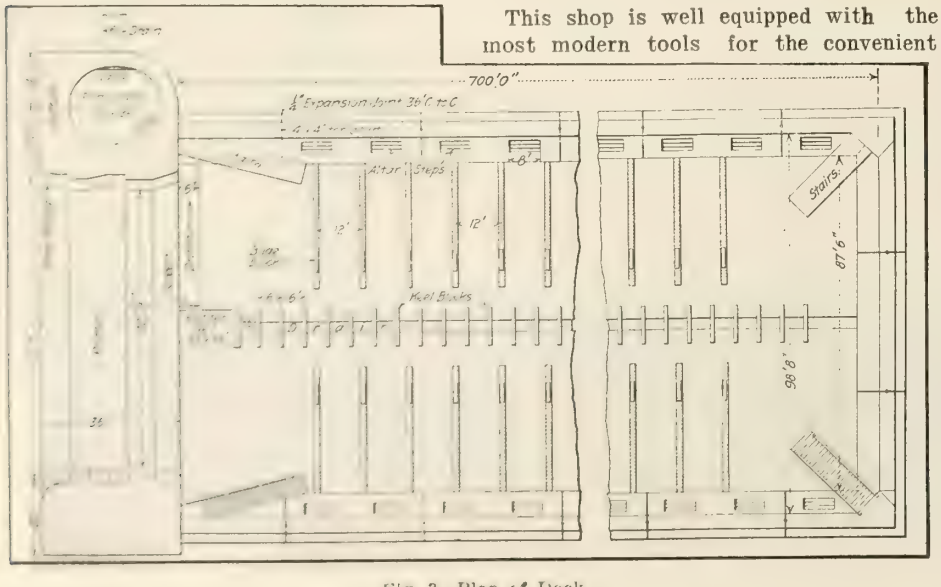


Fig. 3—Plan of Dock.

The west bay is devoted to the petty stores and to the flanging and riveting departments. There is a 150-ton hydraulic sectional flanging press served by a 3-ton hydraulic jib crane. Here all flanging, upsetting and dishing is done. The furnace serving the press is 18 ft. long, by 10 ft. 6 in. wide, and is heated by coal fires; draft being provided by a steel stack 42 inches diameter and 60 feet high. Tube sheets, etc., are heated for flanging in a long open fire, which enables 11 feet to be heated at one operation.

Whenever possible, riveting is done on a 125-ton fixed hydraulic riveter of 10 ft. 6 in. gap. The rivets are heated in a small coal fired rivet furnace on the platform. The accumulator for the riveter and flanging press has a 9-inch ram and a 12 ft. stroke, the working

pressure being 2,000 pounds per square inch. To avoid trouble in winter, oil is used instead of water and is forced to the accumulator by a Deane $2\frac{7}{8}$x12-inch triplex pump driven by a 70 H.P. Westinghouse motor. The accumulator, riveter and flanging press were supplied by the R. D. Wood Co., Philadelphia. Blast for the rivet furnace and open fires is provided by direct coupled motor driven fans.

On completion, all boilers are tested by a motor driven Deane $2\frac{1}{2}$x5-inch triplex pump, the line to the boiler being provided with a safety valve which may be set to any desired test pressure.

Forge and Machine Shops.

These two departments are at present occupying temporary wooden buildings; but it is the intention to build permanent shops for them this year. The blacksmith shop comprises five forges and one 800-lb Bertram hammer, which is operated by air.

boring the cylinders of tugs, etc., when in position.

The machine shop has a well equipped tool store, behind which is located the general material store for valves, pipe fittings, bolts, etc. The upper end of the shop is at present given over to the pattern makers and ship carpenters, and is fully equipped with the necessary wood-working machinery.

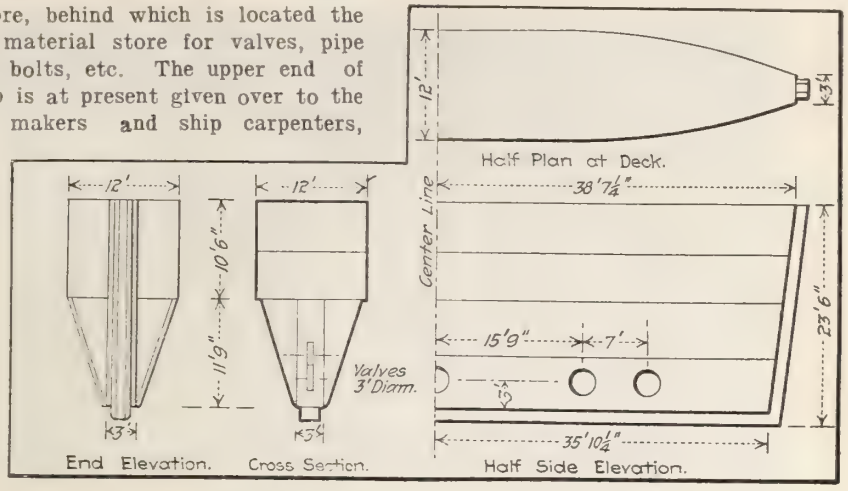


Fig. 4—Dock Gate or Caisson.

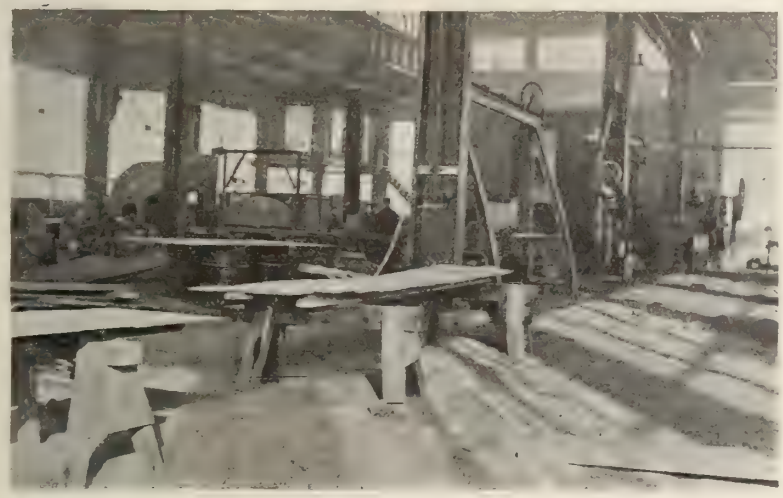


Fig. 7—General View of Boiler Shop.

Most of the machine shop equipment is of Canadian manufacture, with individual motor drive. The John Bertram & Sons Co. supplied a 60-inch shafting lathe, taking 22 ft. 4 ins., between centres; 26 in. engine lathe, taking 10 ft. between centres (motor controlled from carriage); 24-inch shaper; and 48-inch radial drill. The London Machine Tool Co. is represented by a 36 in. x 12 ft. planer, with side head; 10-in. engine lathe with geared head; and 24-inch slotter. There is also an 18-in. engine lathe by the Canada Machinery Corporation and a group drive, comprising one 2-inch and one 8-inch Bignall & Keeler pipe threading machines, Acme bolt cutter, 18 in. engine lathe by Schumacher & Boye, and a double emery grinder.

The company have recently constructed a motor driven boring bar of 10 inch. x 12 feet capacity, for boring out stern tubes, and also have a hand operated bar—6 inches x 10 feet capacity—for re-

Power House.

The power house is situated near the entrance to the dock and contains two motor generator sets each of 250 H.P. generator capacity. The generators are driven by 30-inch belts from 350 H.P. motors taking city current (A.C.) at 2,200 volts. Compressed air is supplied by a Rand air compressor having a capacity of 1,200 cubic feet of free air per minute. This is belt driven by a 200 H.P. motor and delivers air at 100 lbs. pressure. There is an exactly similar compressor in the machine shop.

Water service throughout the plant is provided by a Deane motor driven two-throw pump taking water from Lake Superior. Provision is also made for using city water if required; the latter being always used for drinking purposes. The shops are lighted by enclosed and flame arc lamps, while the building berth and dock are wired for portable incandescent lamps on extension cables.

Work in Hand.

The company are just completing their first vessel. This is the S.S. Hamiltonian, a steel vessel built for the Norcross Bros. Co., Toronto. She is 257 feet long over all, $42\frac{1}{2}$ feet beam and $26\frac{1}{2}$ feet molded depth, being of the



Fig. 6—Punch Shed and Gantry.

maximum size that will pass through the Welland Canal. She is a package freighter and is equipped with a full complement of winches, derricks, etc., for handling this class of goods. Her hull is constructed with longitudinal framing on the Isherwood system, for which the Western Dry-dock and Shipbuilding Co. hold the sole Canadian rights for the Great Lakes. She has a single four-bladed sectional propeller, driven by a 3-crank triple expansion engine with cylinders 18, 24 and 48 inches diameter by 40 inches stroke. The jet condenser is fitted with an Edwards air pump. Steam at 175 lbs. pressure is supplied by two Scotch marine single-ended boilers, 11 feet 6 inches in diameter by 11 feet 6 inches long. Each boiler has two Morrison suspension furnaces, and induced draft on the Ellis and Eaves system is fitted.

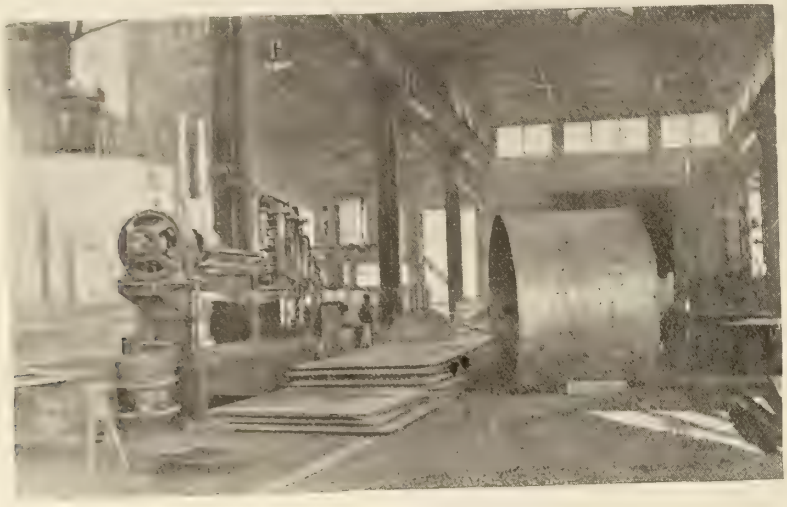


Fig. 8—Centre Bay of Boiler Shop.

The hull, being built on the Isherwood system, will increase her cargo-carrying capacity about 10 per cent. as compared with a vessel of the same size having the usual system of cross framing. In passing through the canals, vessels frequently have considerable side wind to contend with, and are sometimes driven against the stone locks, corrugating the plating and breaking off rivet heads immediately above the tank top. Water leakage results and damages the cargo. To overcome this trouble the Hamiltonian's tank, from boiler room to forepeak, is carried 9 feet up the sides. Thus any leakage resulting from sheared off rivets will go to the double bottom instead of into the cargo.

Orders lately received include a steel stern wheel steamer for the C.P.R. service on the Kootenay Lake. This vessel will be 200 feet long between perpendiculars, 40 feet beam and 8 feet deep. The engines will be tandem compound with cylinders 16⅜ and 35⅜ inches diameter by 96 inches stroke. Steam will be generated by a locomotive type boiler 8 feet in diameter by 28 feet 4 in. long with working pressure of 200 lbs. per square inch.

Another important order lately received calls for a large steel passenger vessel for the Northern Navigation Co. on the same lines as the Hamonic. The vessel will be of steel, 385 long, 52 feet beam and 28.75 feet depth. She will be fitted with a four-cylinder triple expansion engine; steam being furnished by four Scotch type boilers. She will cost about $750,000, and it is planned to have the launching take place in June, 1913.



Fig. 9—Exterior of Boiler Shop.



Fig. 10—Waterfront and 70-ton sheer legs. Boiler shop, punch shed, etc., in background.

BUOY LANTERN ORDERS.

The Dominion Marine Department has ordered 40 buoy lanterns from the Safety Car Heating and Lighting Co., of New York and Montreal. These lanterns have been developed by this company to meet the demands of Lighthouse Bureau requirements. They are supplied with improved flashing mechanism capable of giving a double characteristic; that is, one second light, one and one-half seconds dark; one second light and five seconds dark; the short and long dark periods alternating with one second light periods intervening. They are known as 200 mm., and will be used for coast, harbor and river lighting.

Outline Description of the Ill-Fated Steamship "Titanic"

By Lagan

The disaster which recently overtook this masterpiece of shipbuilding, engineering and luxuriously equipped appointments is without parallel in the marine history of the world, and in view of the widespread attention which has been focussed on the appalling event, the information, and illustrations accompanying same, will be found instructive and valuable.

IT is more or less a matter of history that the steamship Titanic was built at the Queen's Island shipyards, Belfast, Ireland, by Harland & Wolff, a firm world-famed for the size and quality of their merchant marine products. While nominally and generally spoken of as having been a unit of the White Star Line, it may be stated here that the Titanic's ownership was embraced within a much wider scope.



Stern View of the "Olympic" Before Launching.

Ownership of the Titanic.

The White Star Line of steamships is directly owned by a British concern called the Oceanic Steam Navigation Company, the whole share capital of which, however, and representing almost half the total tonnage controlled, is held by an American combination, known as the International Mercantile Marine Co. The nucleus of this International Mercantile Marine Co. was the International Navigation Co., incorporated under the laws of the State of New Jersey, U. S., in June, 1893. This latter concern, owned the American and Red Star lines, which both sailed under the American flag.

In May, 1901, Mr. J. Pierpont Morgan and his associates purchased a controlling interest in the Leyland Steamship Line, and in February, 1902 a like step was taken relative to the Atlantic Transport Line, the White Star and Dominion Lines. At this time, the "Morgan Group," were credited with the intention of securing control of all the Transatlantic shipping lines, including that of the Cunard Company, and as a natural consequence, it was currently believed that the supremacy of British shipping was being assailed.

British Flag—American Control.

While important British lines were thus passing out of British control they still remained under the British flag. Several of the vessels acquired were in receipt of Admiralty subsidies, and agreements were concluded under which the British nationality of these vessels was preserved. So grave, however, was the menace considered, that the British Government took steps, by an agreement with the Cunard Company, to secure the independence of that great line from foreign control. Under this agreement the Government arranged for the building by the Cunard Company of two subsidized steamers of 30,000 tons each, granting the company an annual subvention of $750,000, and a loan of the necessary capital at 2¾ per cent. interest.



The Welin Double-Acting Type Davits on the "Titanic."

The International Mercantile Marine Co.

All told, the International Mercantile Marine Co. had a share capital of $120,000,000, of which half was in six per cent. cumulative preferred shares and half in common shares; the dividends on which were not to exceed 10 per cent. per annum so long as any bonds were outstanding.

Mr. J. Pierpont Morgan was, of course, the moving spirit of the undertaking, although he held no official position in the company. Mr. J. Bruce Is-



Profile of the Ill-fated Steamship "Titanic."

may, of the White Star line, was appointed to the presidency, a position which he has held ever since; and the late Sir Clinton E. Dawkins became vice-president in Great Britain. Mr. Philip A. S. Franklin was appointed vice-president in America, and was subsequently joined by Mr. John Lee in a similar



The "Titanic" in Dry Dock at Belfast.

capacity. Mr. C. A. Griscom was appointed chairman of the board.

Mr. Franklin and Mr. Griscom still hold their respective offices, but Mr. E. C. Grenfell, a partner of Messrs. Morgan, Grenfell & Co., the London house of the Morgan firm, who is chairman of the British Committee of the International Mercantile Marine Company, and Mr. Harold A. Saunderson, another member of the British Committee, and a director of the White Star line, are now the vice-presidents in Great Britain.

Dimensions of the Titanic.

Length over all 882 feet 9 inches; length between perpendiculars, 850 feet; breadth extreme, 92 feet 6 inches; depth moulded to shelter deck, 64 feet 3 inches; depth moulded to bridge deck, 73 feet 3 inches; depth from navigating bridge to keel, 104 feet; load draft, 34 feet 6 inches; gross tonnage, 45,000; I.H.P. reciprocating engines, 30,000; shaft horse power, turbine engine, 16,000.

Structural Features.

There are 8 steel decks amidships, while at each end, an orlop deck is fitted, making 9 decks in all. The main structure of the vessel ends at the bridge deck, which is carried for 550 feet amidships, and to raise the ends of the ship well above the water line without recourse to a large sheer, a poop and forecastle are provided, 106 and 128 feet long, respectively. The keel is formed of a single thickness of plate, 1½ inches thick, and a flat bar 19½ inches wide by 3 inches thick. The shell plates generally are 6 feet wide by 30 feet long, and weigh from 2½ to 3 tons. The largest shell plates are 36 feet long and weigh about 4¼ tons each.

A cellular double bottom, 5 feet 3 inches deep, but increased to 6 feet 3 inches deep in the reciprocating engine room, extending out to the ship's sides, with floors on every frame, is fitted throughout the length of the vessel. The double bottom is divided into 4 compartments transversely by a watertight centre section, and watertight longitudinal on each side, 30 feet from the centre line. The frame spacing is 3 feet amidships, reduced to 24 inches forward, and 27 inches aft. The frames are 10-inch channel section, except at the extreme ends, where a bulb section and reverse bar is adopted. Web frames are fitted on every third frame, in the boiler and turbine rooms, and on every second frame in the reciprocating engine room. Deck beams of channel section, 10 inches deep amidships and bilge keels 25 inches deep, extending for about 300 feet of the ship's length amidships are also fitted. The boat and promenade decks are 94 feet wide. The joints of the bottom plating are double riveted, and those of the topside plating, treble and quadruple riveted. The butts of the bottom plating are overlapped and quadruple riveted, as are also the butts of the side plating, except in way of the topside shell and doublings. On these, double straps are fitted.

Hull Castings.

The stem and stern castings are of Siemens-Martin mild cast steel and have the following weights: Stern frame (2 pieces), 70 tons; after rackets (2 pieces), 73¾ tons; forward brackets (2 pieces), 45 tons; rudder (6 pieces), 101¼ tons; stem bars, 7¼ tons; stem connection to keel, 3½ tons. The rudder is of solid cast steel, and measures 78 feet 8 inches in length over all by 15 feet 3 inches wide. It is built in 5 sections and held together by coupling bolts varying from 3½ to 2 inches diameter. The rudder stock is of ingot steel, 23½ inches diameter, while the pintles are of hard steel, 11 inches diameter.

Watertight Subdivision.

There are 15 transverse watertight bulkheads extending from the double bottom to the upper deck at the forward



The "Titanic" After Launching.

end of the ship, and to the saloon deck at the after end; in both cases high above the water line. The reciprocating engine room compartment is 69 feet long and that of the turbine room, 54 feet long; while the boiler rooms are 57 feet long, with the exception of that nearest the reciprocating engine compartment. The holds are 50 feet long. Watertight doors, giving access between the boiler and engine rooms, are arranged on the drop system, with oil cataracts governing the closing speed. Each door is held in the open position by a friction clutch, which may be instantly released by means of a powerful electro-magnet controlled from the bridge. In the event of accident, the doors may be instantly closed by means of a switch there. Each door can also be closed from below by means of a lever fitted to the friction clutch. As a further precaution, floats are provided beneath the floor level, which, in the event of water entering any of the compartments accidentally, automatically lift and thereby close the doors opening into that subdivision if they have not previously been closed by those in charge.



Captain J. E. Smith, of the "Titanic," Who Went Down With His Ship.

Progress and Finale.

The keel of the Titanic was laid on March 31, 1909. She was framed to the height of the double bottom on May 15, 1909, fully framed on April 6, 1910; plated on October 19, 1910; launched May 31, 1911; left Southampton on her maiden voyage to New York, April 10, 1912; collided with an iceberg in mid-Atlantic about 10.30 p.m., April 14, 1912, and sank early the following morning (about 4 hours after she struck) in about 2,000 fathoms of water, carrying over 1,600 souls to a watery grave.

Machinery and Equipment.

The Titanic was a triple screw steamship, each wing propeller being driven by a 15,000 I.H.P. 4-cylinder, triple expansion, direct acting, vertical, inverted type engine, balanced on the Yarrow, Schlick and Tweedy system; the cylinders of 54-84-97-97 inches diameter by 75 inches stroke, taking steam at 215 pounds per sq. inch from the boilers and exhausting at 9 pounds absolute. Full power was attained when running 75 r.p.m.

24 double-ended boilers, each 15 feet 9 inches diameter by 20 feet long, containing 6 Morison type furnaces of 3 feet, 9 inches internal diameter, and five-single ended boilers, each 15 feet 9 inches diameter by 11 feet 9 inches long, containing 3 Morison type furnaces of 3 feet 9 inches internal diameter, constituted the steam generation installation. The shells of the single-ended boilers were in one strake, while those of the double-ended type were in 3 strakes. The working steam pressure was arranged to be 215 pounds per square inch, for natural draft. The boiler shell plates, of mild steel, were 1 11-16 inches thick.

The low pressure turbine of the Parsons type, which was the driving medium for the centre shaft, took steam from the reciprocating engines at about 9 pounds absolute and exhausted at 1 pound absolute pressure. It developed 16,000 shaft horsepower running at 165 r.p.m. No astern turbine was fitted; the centre shaft being out of action when manoeuvring the ship. The turbine rotor was 12 feet diameter by 12 feet 8 inches long, and weighed, complete, about 130 tons. The crank and thrust shafts of the reciprocating engines were 27 inches diameter, and had a 9-inch hold through their centres. The line shafting was 26¼ inches diameter, while the tail shafts were 28½ inches diameter, with a 12-inch hole through their centres. The turbine shaft was 20½ inches diameter, increased to 22½ inches at the tail end, and having a 10-



THE "AU REVOIR" WHICH WAS "GOOD-BYE."
The scene as the "Titanic" left Southampton on Wednesday, April 10.

inch hole through its centre. The wing propellers were 3-bladed, and 23½ feet diameter, while that of the centre shaft was 4-bladed and 16½ feet diameter.

Engine Rooms.

The reciprocating engine room contained in addition to the main engines, the main feed, hotwell, bilge, sanitary, ballast and fresh water pumps; the auxiliary condenser, surface heater, refrigerating plant, engineers' workshop, etc. The after engine room contained in addition to the low pressure turbine, the main condenser, air and circulating pumps, evaporators, distilling apparatus, forced lubrication pumps and oil coolers, bilge and general purpose pumps.

Electrical Equipment.

The electricity generating central station was located in a separate watertight compartment, 63 feet long by 24 feet high, adjoining the after end of the turbine engine room at the tank top level. The main units consisted of four 400 K.W. engines, and dynamos having a collective output of 16,000 amperes at 100 volts. These and the auxiliary sets were supplied by W. H. Allen, Son & Co., Bedford, England. The main generating engines are of the vertical, 3 crank, compound, forced lubrication type, indicating 580 horsepower, when running 325 r.p.m., with steam of 185 pounds per sq. inch. There is one h.p. cylinder, 17 inches diameter and two L.P. cylinders, each 20 inches diameter, the common stroke being 13 inches. Each engine is direct coupled to a compound wound, continuous current dynamo of the 10 pole type, with interpoles.

The 2 auxiliary generating sets of 30 kilowatts, have the same general features as those of the main units, except that the engines are two crank compound; the cylinders being 9-12 inches diameter by 5 inches stroke. The revolutions are 380 per minute. These are located on a flat in the engine casing at the saloon deck level, and have connections independent of the main lighting units to each boiler room, so as to be available in circumstances of temporary disablement of the former.

General.

For the rapid handling of cargo, mails, passengers' baggage, etc., there were installed convenient to hatchways, electric cranes of 1½ to 2½ tons capacity, and electric winches of 3 tons capacity. The steam steering engine, located in the poop at the after end of the shelter deck, consisted of 2 sets of 3 crank, vertical, inverted type units, with cylinders 17 inches diameter by 18 stroke. Either set was available for the work, and operated by means of a bevel wheel and pinion through a spring quadrant and tiller on the rudder head. Control was had from the navigating bridge. Needless to remark, the equipment for heating, cooling and ventilating was the most up-to-date of its kind.

The wireless telegraphy installation consisted of a 1½ kilowatt standard ship's set, and was located on the boat deck adjoining the officers' cabins. There were two complete sets of apparatus, one for receiving and another for transmiting messages; the former being located in a sound-proof chamber.

Of the 4 funnels with which the vessel was equipped, the forward three only were used for boiler room purposes; the fourth or after stack being requisitioned for ventilating and cook's galley services.

The Titanic was fitted with the Submarine Signal Co.'s apparatus for receiving submarine signals. With this system the sound of submarine bells is received through the hull. By locating the direction of the sounds, the position of the vessel, when in the neighborhood of the coast, can be accurately ascertained.

The mooring and warping arrangements were taken care of by a powerful steam windlass and capstans, while a strongly built crane on the centre of the forecastle deck handled the 15½ tons central chamber. The 30-foot lifeboats were under the control of 16 sets of the Welin double-acting type davits, specially designed for operating two, or if desired, 3 boats each. For hoisting or lowering the boats, four 15 cwt. electric winches were provided.

Passenger Accommodation.

It may at once be said that all previous effort in the direction of at least first class passenger accommodation and luxury of appointment had been easily excelled in the case of the Titanic as the acme of marine achievement, and perhaps as regards the most sumptious hostelries ashore. Provision was made for the carrying of some 2,450 passengers of all classes, which, with a crew of 850 for all purposes, represented a total of 3,300 souls on board, as a full complement of the crew, approximately 65 belonged to the navigating department, 320 to the engineering department, and the balance, 465, to the stewards and catering section.

Grand entrances, grand staircases, sumptuously furnished dining, lounge, reception, smoking, reading and writing rooms; restaurants, verandah cafes and palm courts; en suite and special staterooms; most modernly equipped Turkish and swimming baths; squash racquet court, gymnasium and passenger elevators, were features which put well in the background the nearest approach to the magnificence of this ocean palace, now a mangled and tangled wreck on the bottom of the Atlantic.

12,000 Feet Deep.

Foundering about 41 deg. 16 min. north latitude, 50 deg. 14 min. west longitude, the Titanic is now lying roughly 12,000 feet deep, or considerably over two miles below the surface of the water. At that great depth, the pressure of the water is about two and a half tons to the square inch, and at 12,000 feet deep a man would bear upopn his body a weight equal to that of twenty locomotive engines, each with a long goods train loaded with pig iron. The conditions of pressure at this depth are such that the woodwork and furniture of the world's largest liner are possibly compressed out of shape, the gorgeous fittings probably crushed beyond recognition, and the watertight doors of unflooded parts of the vessel smashed in like so much matchwood. As even at depths of about 200 feet divers have great difficulty in carrying out their work, any attempt at salvage is out of the question. Oh! Titanic!

PORT FACILITIES ON GREAT LAKES.

LAKE Erie.—The recommended draft by the Lake Carriers' Association for vessels bound to and from Lake Erie ports is as follows: Fairport, 19 feet 6 inches; Buffalo, 19 feet 5 inches; Conneaut, 18 feet 6 inches; Ashtabula, below the bridge, 17 feet; Ashtabula, above the bridge, 18 feet 6 inches, and Welland Canal, 10 feet.

Lime Kiln Crossing, Detroit River.—The recommended draft by the Lake Carriers' Association for vessels using the Lime Kiln Crossing, Detroit River, is now 19 feet.

Port Washington Harbor, Wis.—Soundings completed April 11, 1912, indicate a shoal nearly filling the entrance to the piers, with a least depth of 16.5 feet over it. Shoaling has also occurred along the sides of the channel between the piers and at the mouth of the north arm of the basin. At the present stage of water it would be unsafe for vessels drawing more than 13 feet to attempt to enter the harbor.

Niagara River. — The recommended draft by the Lake Carriers' Association for the Niagara River is 13 feet 2 inches.

St. Clair River.—Wrecking operations are under way on the steamer Joilet at Port Huron. Upbound vessels should take the Canadian side and downbound vessels the American side, and slow down when passing the wrecking outfit. Vessels going too fast by the wreck or too close to it are liable to run foul of the anchors and chains of the barges,

and also seriously interfere with the divers. Masters of vessels should check down as slow as possible when passing and give the wreck as wide a berth as possible.

THOUSAND ISLANDS AND ST. LAWRENCE RIVER STEAMBOAT CO. OFFICERS.

OFFICERS of the Thousand Islands & St. Lawrence River Steamboat Co. vessels for the 1912 season of navigation have been appointed as follows:—

Steamer Thousand Islander—Captain Charles H. Kendal; First Officer, W. H. Murdoch; Chief Engineer, B. F. Farrell; Assistant Engineer, John Weeks; Purser, J. T. Canfield.

Steamer St. Lawrence—Captain, John Bertrand; First Officer, J. W. McAvoy; Chief Engineer, J. E. Marshall; Purser, R. I. Morse.

Steamer New Island Wanderer—Captain, William C. Hudson; First Officer, Joseph Bongton; Engineer, John A. Cook; Assistant Engineer, Clinton F. Philow; Purser, E. C. Resch.

Steamer Newsboy — Captain, E. M. Charlebois; Chief Engineer, W. E. Boyce; Purser, Hector A. Thibault.

Steamer America — Captain, R. H. Carnegie; First Officer, David Cummings; Chief Engineer, James Gillie; Assistant Engineer, William Hartley, Steward, Arthur Sparham.

CANTILEVER FRAMED STEAMER.

ON Saturday, 6th April, the cantilever framed steamer Hochelaga, built by Sir Raylton Dixon & Co., Ltd., at the Cleveland dockyard, Middlesbrough, to the order of Messrs. Furness, Withy & Co., Ltd., of West Hartlepool, London, etc., proceeded to sea for her official trials.

The vessel has been specially designed to meet the requirements of the Dominion Coal Co.'s trade from Sydney, Cape Breton, to Montreal, Canada, and is of the latest improved type of patent cantilever construction with top-side water ballast tanks. Most of the vessels in this trade are fitted in this manner, the arrangements being originally introduced by Messrs. Sir Raylton Dixon & Co., Ltd., who are the builders of no less than nine steamers for this service.

Her principal dimensions are 388 ft. 3 in. by 52 ft. by 29 ft. 9 in. moulded, and she has a dead-weight carrying capacity of about 7,600 tons on a light draft of water. She has been constructed to the highest class at British Corporation, and is of the single deck type with poop, bridge, and forecastle. She has 11 hatchways and four holds absolutely free from all obstructions such as beams, pillars, or web frames, and perfectly self-trimming owing to the sloping sides of the top-side tanks at each side of the ship. Of the total amount of about 2,400 tons of water ballast which the vessel can carry, about half that quantity will be in the top-side tanks. The vessel has 12 derrick posts and 20 derricks, four boats, hand and steam steering gear, and is equipped with 10 steam winches, steam windlass, etc., and all the latest and most modern appliances for the rapid handling of cargo.

Triple expansion engines having cylinders 26 in., 44 in., and 73 in. by 48 in. stroke, supplied with steam by three large single-ended boilers working at 180 lbs. pressure, have been fitted by Messrs. Richardsons, Westgarth & Co., Middlesbrough.

The trials passed off most successfully, a speed of over 12 knots being attained.

The hull and machinery have been constructed under the superintendence of Messrs. W. Copeman, E. W. Harvey, and C. H. Claydon, and D. Ross, the owners' superintendents.

COMPASS VARIATION IN HUDSON BAY.

A SYSTEMATIC attempt will be made this summer by the Department of Naval Service to ascertain the conditions connected with the reported local attraction and inaccuracy of the compass, which many mariners allege has rendered navigation of the Hudson Bay somewhat dangerous and uncertain. It has been stated that very serious deviations, ranging as high in some cases as 45 degrees, have been recorded in compasses affected by the east and west shores of the bay, and that owing to this, wrecks in some instances have been narrowly averted.

The general unreliability of the compass through this deviation is considered a real source of danger, and many mariners regard it as the "great bugbear" of Hudson Bay navigation. The Government is determined, however, to find out definitely for itself, and to this end W. J. Jackson, a magnetic expert from the Meteorological Office at Toronto, will at an early date make a trip to the bay on the Burleigh, and will undertake a thorough study of the variation in the compass, and magnetic conditions generally.

CHIEF ENGINEER'S BRANCH, DEPT. MARINE AND FISHERIES.

THE Chief Engineer's branch of the Department of Marine and Fisheries is entrusted with the construction of all aids to navigation, and, in consequence of the rapid development of Canadian shipping, an immense amount of work is now undertaken annually. At present the yearly expenditure is $1,000,000, but as this is distributed in comparatively small amounts all over the Dominion, the detail of designing required is very great. During the past season the principal construction work undertaken by the Department of Marine and Fisheries included the erection of range lights on Badgeley Island, Lake Huron; the construction of reinforced concrete lighthouses with accessory buildings on Michipicoten Island and Parisienne Island on Lake Superior; the construction of range lights to lead into Kingston Harbor; the rebuilding in reinforced concrete of the rock lighthouse at the entrance to Parry Sound, and the installation in the new building of a diaphone fog alarm; the complete remodelling of the light station on the south point of the Island of Anticosti, with the installation of a modern fog alarm; the building of a first order lightstation at Point Ferolle in Newfoundland; the construction of two lighthouses on piers in Gaspe Harbor; the preliminary work of construction of a lighthouse on Flat Island, and another on St. Mary's Island, on the Labrador coast; the lighting and buoying of a new channel below St. Anne, at the mouth of the Ottawa River; the building of a lighthouse on a concrete pier designed to resist ice shoves near St. Helen's Island, Montreal; the establishment of a fog alarm at the entrance to Prim Point, N.S.; and the building of a lighthouse on a composite pier in Sydney Harbor, N.S.—Contract Record.

WIRELESS TELEGRAPHY — THE GREAT LAKES TO THE ATLANTIC.

THAT in the very near future, Canada will have in operation a wireless telegraph system, by which through communication will be established all the way from Port Arthur at the head of the lakes to Belle Isle or Cape Race, is the statement of C. P. Edwards, General Superintendent of the Government Wireless Department. The system will include a chain of stations, approximately 180 miles apart, from Port Arthur to Kingston, with a station at the latter point of sufficient range to communicate with Montreal, thus linking up with the equipment already installed and in operation on the east coast, and giving through communication to Belle Isle or Cape Race. This line of communication will be one of the longest systems of Government wireless in the world.

Already the proposed scheme is approaching reality, for at three points east of Port Arthur, the buildings are

completed and the apparatus and masts are in process of being installed. These are Sault Ste. Marie, Midland and Tobermory; the Port Arthur station having already been in operation since 1910. In two or three weeks these three new stations will be in operation, having a range covering the expanse of Lake Superior, Lake Huron and the Georgian Bay.

In addition, there is a probability that stations will this year be installed at Point Edward and Port Stanley on Lake Erie. The former is the port to which the Northern Navigation Company's boats run. The installation of an apparatus at Port Colborne is also in contemplation, and at a later date Toronto and Kingston will be linked up, communication with Montreal, thereafter, only being required to complete the scheme.

Improvements and extensions are also being pushed forward on the west coast. In this connection it is interesting to note that the figures for the fiscal year ended March 31, 1912, just at hand, show a remarkable increase in messages received over those of the previous year; no less than 73,000 messages as against 48,000 having been handled, and no less than 978,193 words as against 647,461 having been transmitted.

The figures for the eastern systems are not yet to hand.

PANAMA CANAL LOCK WORKING MODEL.

A WORKING Model of a section of the locks on the Panama Canal, embracing the intermediate gates of a summit level, has been constructed at the Georgia shops by the model maker, Taylor T. Curran. It is on a scale of one-half inch to a foot, and shows not only the construction of the lock chambers but also the method of operating the gates and other machinery. It will be on exhibition at the International Navigation Congress in Philadelphia, May 23 to 28, and, later, will probably form part of the Canal exhibit at the Exposition in San Francisco. The following description accompanies the model: —

Mitering Gates.

These gates are of the straight horizontal by-framed type, consisting of horizontal girders spaced from 3 feet 8 inches to 5 feet apart, a vertical system of frames and intercostals, and a double sheathing. The lower half of the leaf forms an air chamber, sub-divided by three vertical partitions. The pressure of the leaves against each other and against the hollow quoins is transmitted by slightly curved metallic bearing plates of hard steel, which after accurate adjustment, are backed up by babbit metal. The positions of the main girders, frames and intercostals, as well as the arrangement of rivets, doubling plates, etc., are indicated in the model gates, and two panels of the sheathing are omitted at the top of one of the leaves to permit the inetrior construction to be inspected.

Miter Forcing and Locking Mechanism.

When the gates are within 6 inches of the mitering position (1-4 inch on the model) they may be drawn together, and securely locked by a miter forcing and locking device on the end of one gate leaf, consisting of powerful jaws which clasp a pin in the end of the other leaf, the power being transmitted by a toggle joint actuated by a motor driven screw.

Miter Gate Operating Mechanism.

This device is so designed that the speed of the gate varies approximately on the ordinate of the sine curve. The machine gives a maximum force with a minimum gate movement at the ends and a minimum force and maximum speed at the middle of the path of the gate leaf in opening and closing. This desirable combination of speed and force, by this new device, can be obtained by the use of a constant speed motor.

As shown on the model, motion is given by a horizontal strut which takes hold of the leaf through the medium of a vertical pin attached to the top girder. A nest of helical springs is placed in the gate end of the strut, to absorb shock and prevent breakage. The shore end of the strut is pivoted to a crank pin attached near the outer circumference of a large horizontal gear wheel, the pitch diameter of which is 19 feet 1 inch. This gear wheel is turned by a pinion actuated by the motor, through reducing gears.

Culvert Valves and Machinery.

The main culverts at the locks are divided by a central pier into two branches, 8 feet by 18 inches in area. Each of these branches is closed by a lifting valve of the Stoney type, uncounterweighter. These valves are operated through stems which pass through a stuffing box in a watertight bulvhead and into the machinery well where connection is made to a crosshead which is actuated by two non-rising screws geared to an electric motor. The lateral culverts leading from the main middle wall culverts are each controlled by a cylindrical valve operated by a vertical stem connected through a revolving screw and gears to an electric motor.

Protective Devices.

The main protection against boats damaging the gates of the summit locks of the canal is a huge chain, which, when protecting the gates, is stretched across the lock just above the water line and is lowered to the bottom for boats to pass over. As shown in the model, the chain passes over a train of sheaves, two of which are fastened to the outside of a set of telescoping hydraulic cylinders, thus reducing the cylinder movement to one-fourth the chain movement.

The system consists of one large fixed cylinder, one slightly smaller cylinder moving within this, and a fixed plunger upon which the smaller cylinder moves. For ordinary operation the chain is raised or lowered by pumping water into the larger or smaller cylinder, respectively. If a moving ship should strike the fender chain, the latter when stressed to 220,000 pounds will produce a hydraulic pressure of 750 pounds per square inch in the cylinder, which pressure automatically opens a resistance valve and permits water to flow out of the cylinder; thus maintaining a constant pressure in the cylinder and hence a constant stress on the chain while the latter is paying out and bringing the ship to rest.

The Model.

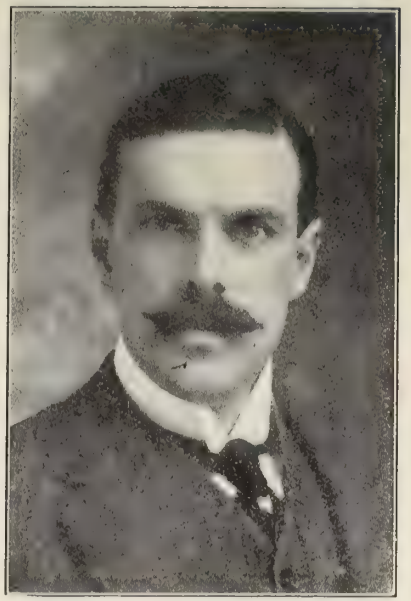
The model is 6 feet 4 inches in length, and 8 feet 6 inches in width, and includes one lock chamber and enough of the center wall to show the relation of the twin chambers to one another. It is built up on six-inch I beams; three running laterally and two lengthwise. On this base is erected a frame of one-inch angle iron joined with inch band iron, over which is stretched heavy wire screen of 3-4-inch mesh, the whole frame being from 1-2 to 1 inch under scale. Upon this framework is plastered a cement mortar varying from one-half inch to one inch thickness on the inside of the mesh, and from one to three inches on the outside, the whole being thus brought up to scale. The result is a model that looks exactly like the concrete walls of the locks, showing in addition, because it is in section, the method of stepping up the walls in the back from broad base to narrow top, the relation of the water supply culverts in the side and center walls, the machinery chambers and operating tunnels, towing tracks on top of the lock walls, decorative lamps along the coping, and even the ladder by means of which one may climb from the bottom to the top of the chamber, and the gauge which indicates the depth of the water. In the forebay, part of the floor of the chamber is made so that it can be lifted out, showing the relation of the lateral culverts under the floor to the supply culverts in the side walls.

The section is taken in a chamber where the gates are 77 feet high, and those in the model are therefore 3 feet 2 1-2 inches high. In the original they

Continued on page 124.



P. R. WARREN, CHIEF ENGINEER,
The Norton Griffiths Co., Ltd. (Canada).



J. NORTON GRIFFITHS, M.P.,
Pres. the Norton Griffiths Co., Ltd. (Canada).



W. BURTON STEWART,
Managing Director, the Norton Griffiths Co., Ltd. (Canada).



Harbor of St. John, N.B., as it will Appear When the Docks, Wharves, Breakwater and Railroad Terminals are Completed.

St. John, N.B., the Atlantic Seaport With a Mighty Future

By Levengrove

It is abundantly evident that the next decade will witness the rise into prominence of this old-time city as the Dominion's leading port on the Atlantic Coast for winter freight and passenger service. Some there are who predict for it the flattering cognomen of "The Liverpool of Canada," and if railroad, dock and harbor developments are a criterion, we are disposed to agree with the prophecy.

THE Dominion Government has recently given the contract for the construction at St. John, N. B., of two miles of docks, a dry dock, and ship repairing plant, costing $12,000,000 to the Norton Griffiths Co., Canada, Ltd.

The Docks.

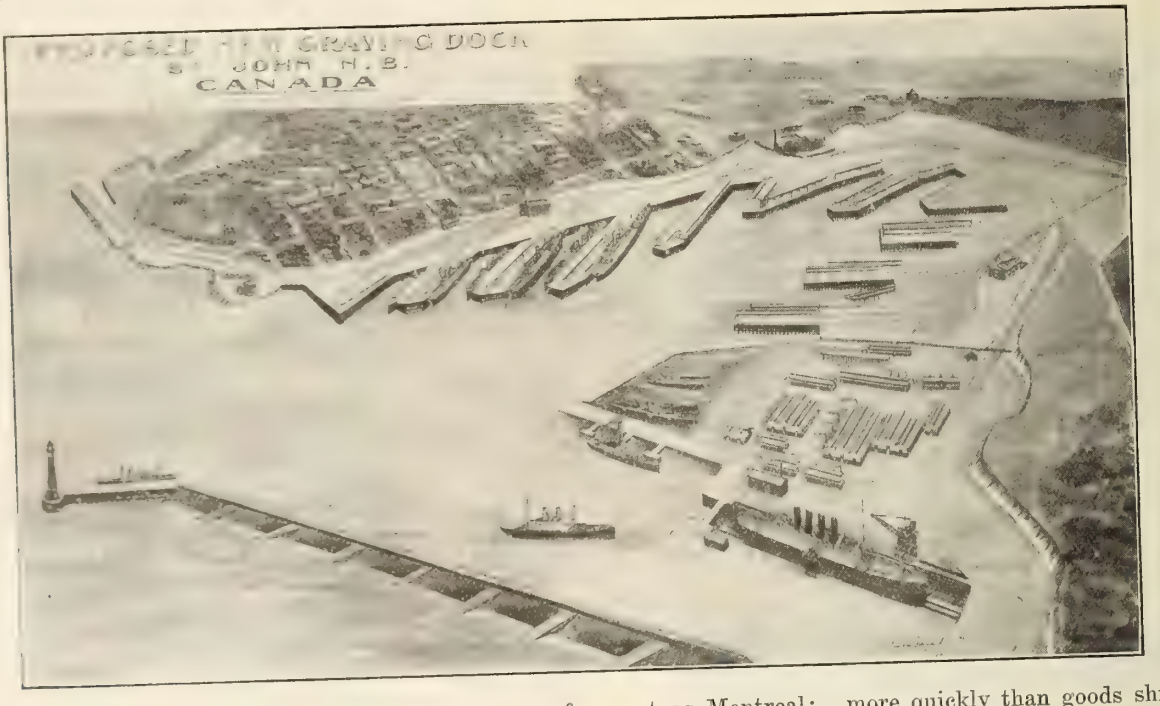
The two miles of docks—twenty-three in all—are for the terminals of the Grand Trunk Pacific Railway Co. The dry dock, to be operated by its builders, will be one of the largest in the world, and there is also every possibility of a steel shipbuilding plant being established in the comparatively near future, the owners of one such having an agreement with the Norton Griffiths firm to come to St. John when the dock and harbor work is sufficiently advanced.

The C. P. R. already have terminal facilities at St. John, using seven docks, each capable of accommodating two vessels. These have, however, been found too small, and eleven more of like capacity are being built by the Government for the use of that railroad. In addition, the International Railway have two docks, and there are two more at the Pettingill wharf, owned by the city.

Again, it is said that the C. N. R. is practically certain to make St. John its Atlantic terminus.

Three Transcontinentals.

This will give St. John three transcontinental railways emptying the products of Western Canada and the United States on her wharves. Add to the railways, the Intercolonial, covering a rich territory as far west as Montreal; the St. John Valley Railway, which will tap, with its branches, the heart of the rich farming land of New Brunswick, and the upper reaches of the St. John River, navigable 100 miles inland, with its four branches, each navigable for over fifty miles, bringing the products of the farms right to the ship's side; then it will be at once seen that there are immense possibilities ahead for this progressive port.



Comparison of Distances.

A comparison of distance of time and transit between Liverpool and Chicago, by the New York and St. John routes respectively, illustrates most emphatically the favorable position of St. John. The actual distance from Liverpool via St. John to Chicago is 24 miles less than the distance via New York, while in point of time consumed in transit of goods, the Canadian route has a much greater advantage. The shorter railway haul from New York to Chicago is joined to a longer ocean voyage from Liverpool, and therefore slower time is made on the New York route. Assuming steamers and trains on the two routes to be of the same relative speed, the St. John route is decidedly the faster of the two.

As to the Canadian trade, while St. John, as compared with Halifax, has two hundred and fifty miles longer ocean voyage from Liverpool, it has a shorter railway haul of 356 miles by the Canadian Pacific Railway to Montreal, and will be served by three competitive lines of railway to that point, and four to the Pacific Coast. By actual experience merchandise shipped from Liverpool via St. John, reaches Montreal, Toronto and other western points much more quickly than goods shipped at the same time via Portland.

During the session of 1908, the Dominion Parliament passed an Act providing that the British Preferential Duty be allowed, after the act is called in force, only on goods entering Canada through a Canadian port. The present Government have said that they intend to carry out the intention of the former Government, and on the completion of the Grand Trunk Pacific, will issue an order-in-council putting the Act into force. This will mean that all the British goods now imported into Canada through Portland, Boston, Providence, New York and other United States ports, will then have to pass through St. John.

MASTERS AND MATES EXAMINATION OFFICES, COLLINGWOOD, ONT.

DURING the visit of the Hon. J. D. Hazen, Minister of the Department of Marine and Fisheries, Ottawa, to Collingwood, on April 30th, he took occasion to visit the Examination Rooms for Masters and Mates, when he was agreeably surprised with the arrangements made for carrying on the work and with the display of Instruments and Models. While making the inspection, he inquired for and obtained from the Examiner, Capt. G. C. Coles, much information regarding the conduct of the office, and showed a deep and keen interest in what was being done. He also discussed matters concerning the equipment of vessels as regards the safety of the traveling public, and such floating property as particularly pertains to the Marine and Fisheries Department.

The people of Collingwood were greatly impressed with the Hon. Minister's thorough grasp of the question of the marine requirements of the Dominion, and it was heard said that if the Borden Government had a Cabinet composed of such as Mr. Hazen, it would be well for the country's future welfare.

ANOTHER OIL-ENGINED CANADIAN VESSEL.

The second oil-engined vessel built on the Clyde is expected to be ready to sail for Canada about the end of next month. This vessel, the Indian, is being constructed by the Clyde Shipbuilding and Engineering Co., Port Glasgow, for the Merchants' Mutual Line, for their service between Montreal and Fort William. She is of the lake freighter type, 257 ft. in length, 42½ ft. in breadth, 26½ ft. in depth, and of 4,000 tons carrying capacity. She will be propelled by a Carels-Diesel oil engine, of 1,100 h.p., driving a single screw.

The engine is of the four-cylinder, two-cycle type, with a bore of 18 in., and a stroke of 36 in. The cooling water is circulated by a pump driven by a steam engine, the steam for which is obtained from a donkey boiler fired with oil fuel, and which also operates the other auxiliary appliances throughout the ship. Sufficient fuel will be carried to keep the main engine running for 25 days, and the bunkers require only about one-tenth of the space which would have been occupied by the storage of coal. A speed of 13 knots is expected, and the builders have guaranteed the vessel for six months of regular service.

TEST OF MARINE THERMOMETER.

The Minister of Marine will afford Prof. H. T. Barnes, of McGill University, an opportunity to make a practical test of his micro-thermometer, the instrument devised by the professor to give warning of the presence of icebergs at sea. A test of the apparatus was made in the Gulf of St. Lawrence by the steamer Stanley in 1910. The minister's intention now is to give it a further and more extensive trial. To this end the Government ice-breaking steamer Montcalm will be commissioned to cruise during the month of June next in the waters of Belle Isle and between that point and the entrance of Hudson Straits, equipped with the micro-thermometer. Every precaution will be taken to give the instrument a thorough trial. Should it prove efficacious in indicating, at any considerable distance from the ship, the existence of ice in quantity, doubtless the micro-thermometer will be adopted as a standard adjunct to modern equipment designed to help assure the safety of ships at sea.

MERCHANTS' MUTUAL LINE APPOINTMENTS.

Acadian —Captain, R. McIntyre; chief engineer, J. S. Duguid.

Canadian — Captain, W. Anderson; chief engineer, R. McLaren.

Renvoyle—Captain, Harry Redfern; chief engineer, A. McLaren.

A. E. McKinstry — Captain, A. E. Stinson; chief engineer, A. C. Leitch.

Indian — Captain, H. W. LaRush; chief engineer, Oscar Lird.

Hamiltonian—Captain, A. B. McIntyre; chief engineer, A. E. Kennedy.

Calgarian—No appointments.

D. A. Gordon—Captain, R. F. Payette; chief engineer, George Adams.

J. H. Plummer—Captain, P. McIntyre; chief engineer, R. Chalmers.

A. E. Ames — Captain, F. Dalby; chief engineer, Lorne McMillan.

H. M. Pellatt—Captain, Ed. McKonkey; chief engineer, Wm. Harmon.

Saskatoon — Captain, P. McArthy; chief engineer, John Voguhart.

Beaverton — Captain, Wm. Zealand; chief engineer, Hugh Myler.

Mapleton—Captain, R. D. Simpson; chief engineer, H. McDonald.

Scottish Hero — Captain, F. Davis; chief engineer, J. W. Taylor.

Turret Chief — Captain, H. Aitkens; chief engineer, A. E. House.

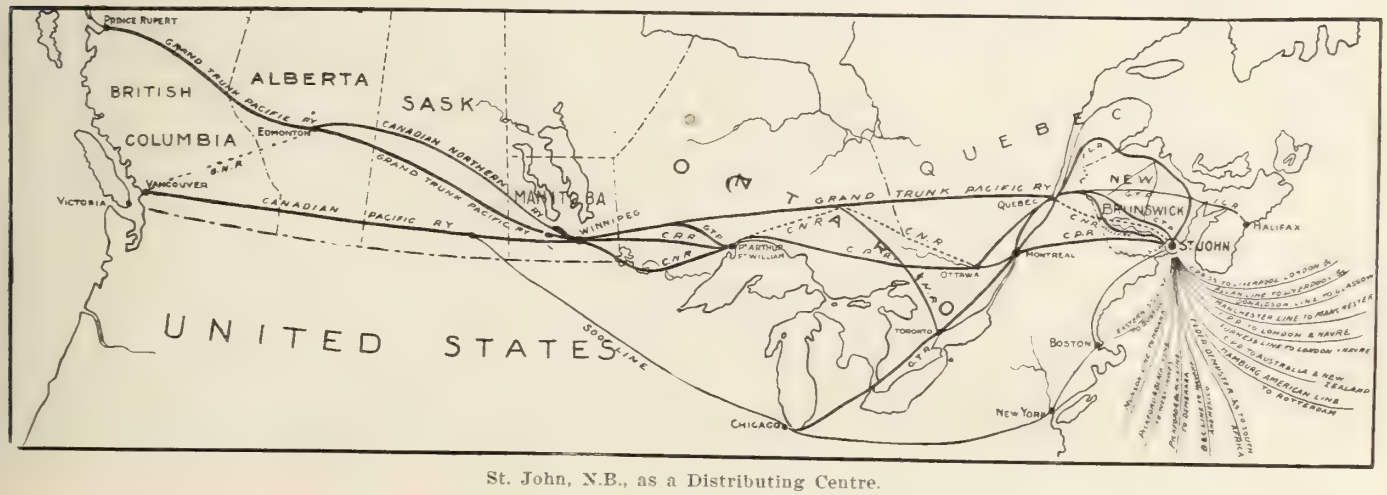
Turret Court—Captain, Nat Bennet; chief engineer, S. Jones.

Practically all of the engineers of the boats are aboard, fitting out for the season's work.

INLAND MASTERS AND MATES.

Following the suggestions made recently by the Dominion Marine Association to the Minister of Marine with reference to changes considered necessary in examinations for masters' and mates' certificates for inland waters, the whole question is under the department's consideration with a view to afford better facilities to candidates and to organize a better system of examinations, which will, no doubt, be to some extent, in harmony with the association's suggestions.

The department has pro tem opened a school for the education of candidates at



St. John, N.B., as a Distributing Centre.

one of the ports and is willing to consider the question of assistance to the various technical schools, of which three have now been opened at large ports. These schools intend giving courses in navigation, etc., to those desiring to undergo examinations for marine certificates, both officers and engineers.

A TALL ONE.

THE American of May 4 says that when the Titanic left the Belfast yards of Harland & Wolff, her builders, for her short run to Southampton, where she was to enter immediately the passenger service of the White Star Line, her watertight compartment doors were not working, and that no attempt was made to test them on her maiden voyage to New York, for fear they would stick, and that all the doors were open when the ship struck the iceberg, and remained open.

The article goes on to say that it was because no attempt had been made to test the safety devices, speed or seaworthiness that Thos. Andrews, jr., who assisted in designing and superintending the construction of the Titanic, and was a member of the board of directors of Harland & Wolff, and John Bradley Cummings, another of the directors, who sailed on the Titanic, remained aboard when she sank, without making any effort, even when importuned by friends to do so, to escape.

Andrews and Cummings were accompanied by twelve master mechanics and about forty more of the shipyard employes, because they feared serious responsibility to their firm in allowing the ship to leave the yards in an unfinished state.

The foregoing seems on a par with the moon and bridge, the kissing and express train yarns.

THE TITANIC DISASTER.

TITANIC, indeed! Only in an age when man has dared so much could so colossal a response to his daring be hurled upon him. For this is unlike great cataclysms of Nature which have overwhelmed communities in what are really the modern vestiges of great geological changes. The encounter in which the latest and most perfect marine creation went down, was one of man's own provoking. The greatest engineering work ever created by human hands and brains, the fruit of years of thought and toil, puts forth with confidence unreached even by the faintest suggestion of uncertainty; yet before half the chances of a single ocean crossing have been met, Nature has given her answer. The Titanic is crushed by her ice monsters as certainly, as relentlessly, as utterly, as any frail shell in a wild bird's nest is crushed by the driving hail. The vast bulk, the vast dynamic energy of this mechanical creation are turned to its own destruction.

Two things of broad significance seem clear. The first is that the disaster is characteristic of the modern system of colossal centralization. The vast ship, like the vast business, depends ultimately on the individual—the single judgment, and when that one mind errs, as at any moment it may, and inevitably at some time it will, colossal disaster follows. Second, the speed mania which imposes even upon the most experienced, the most cautious, a disposition to take chances which their judgment should prohibit, has, it is greatly to be feared, a large part in the responsibility for this horror.—Eng. Magazine.

THE CUNARD STEAMSHIP AQUITANIA.

THE stern frame, the after and forward brackets for the new Cunard steamship Aquitania, now being built by Messrs. John Brown & Co. at Clydebank, Scotland, have recently been completed by the Darlington Forge Company (Limited), who were also responsible for the stern frames, brackets, and rudders not only of the Lusitania and Mauretania, but also of the Olympic and Titanic.

The stern frame of the Aquitania is of special quality Siemens-Martin mild cast steel, and is of hollow or "dished" section. The weight of the stern frame and brackets is 130 tons, of which the main piece of the stern frame (which was cast in one piece) represents 50 tons, the after brackets 33 tons, and the forward brackets 35 tons. Four propellers are arranged for; two are carried by the after brackets, which are connected with the foremost end of the stern frame casting, and the other two are arranged 86 ft. further forward and supported in similar brackets. These castings have the following dimensions:—Stern frame, extreme length, fore and aft, 44 ft.; extreme height, 42 ft.; and extreme width, 12 ft. 6 in.; forward brackets, centre of shafts, 57 ft.; diameter of bosses, 4 ft. 3 in.; after brackets, centre of shafts, 20 ft.; diameter of bosses, 4 ft. 3 in. The rudder, not yet completed, will be of the balanced type, and of solid cast steel built in three sections. The stock will, however, be of forged steel. The total weight of the rudder will be 70 tons, the extreme width of blade 28 ft., and the diameter of stock 25 in. The pintle, 18½ in. diameter, is arranged so that it can be readily unshipped. Upon the nut being removed, the pintle can be lowered into a cavity in the blade immediately below, and then drawn out through special doors, 4 ft. 3 in. by 1 ft. 9 in., formed one on either side of the rudder blade.

In casting the main piece of the stern frame, 75 tons of molten metal were used, and as now completed its weight is 50 tons. The making of the mould in which the stern frame was cast represented two months' work, and the completion of the finished castings another five months.

LATE GENERAL NEWS.

The White Star Company is playing the game. In spite of the heavy financial loss caused by the sinking of the Titanic, the company is building a still larger, and, if possible, a finer vessel, and has voluntarily set apart a large sum for the payment of proved damages on account of loss of life.

Bremen, Germany.—On account of the extraordinary change in the course of icebergs, which are this year being found much farther to the south than usual, the transatlantic lines have ordered the commanders of their steamers to follow a more southerly track. On the westward route they are to follow latitude 38 north, and on the eastward route latitude 37.40 north, between the 45th and 50th degrees of longitude.

Kingston, Ont.—A despatch from Ogdensburg, N.Y., states that the Richelieu and Ontario Navigation Company has acquired control of the Thousand Island Steamboat Company, and that the transfer will take effect on June 1st. The president of the company, R. Crawford, of this city, says he was not aware of any negotiations, and does not believe that the R. & O. has secured control. A large amount of capital stock is held by Toronto people. The Thousand Island Steamboat Co. is largely local in character, and it would seem unlikely that a through line would desire to have it.

Ottawa, Ont.—The Public Service Commission left on May 13 for Sorel to conduct an enquiry into the methods at the Government shipyard there. Its accountants and auditors have already been investigating at Sorel.

The Polson Iron Works have entered action against J. J. Main to recover $16,144.65 alleged due for calls upon shares in the company.

New York.—A London cable says:—Liabilities totalling approximately $6,875,000 were discharged May 13 by Lloyds' Underwriters and Marine Insurance Company, as a result of the Titanic disaster. Insurance on the hull amounted to $3,690,000, this risk being held by insurance concerns, while the remainder was held by the White Star

Line. The costliest item in the cargo was a consignment of rubber worth $125,000. About $1,500,000 covers the loss on personal effects belonging to passengers, a shipment of bonds being also included in the latter sum.

Shipbuilding Work.—The American-Hawaiian Steamship Co. has closed with the Maryland Steel Co. for three additional ocean freight vessels, to be operated through the Panama canal. This makes a total of eight boats of the type under contract for this steamship company with the Sparrows Point yard. The boats will each be of about 10,000 tons displacement and together will require about 18,000 tons of shapes and plates for delivery in 1913. The additional contract fills the ways of the Maryland Steel Co. on large work for more than two years ahead. Another eastern yard is reported to have taken a large boat for a Pacific coast steamship interest. The volume of shipbuilding work on the books of eastern yards now runs into several millions.

London, Eng.—The London papers publish a statement made by The Liverpool Journal of Commerce that Mr. J. Bruce Ismay intends to provide an endowment fund for pensions for disabled seamen of all classes connected with the White Star Line and for their widows as a thank offering and a memorial to the heroism of the Titanic's crew. The fund, it is further said, will probably amount to $100,000.

Kingston, Ont.—Members of the local Lord's Day Alliance were responsible for stopping work on Sunday last on the Government tug Bellechasse, in the Kingston Shipbuilding Company's yards here. They telephoned one of the local directors, who ordered the work to cease. The Bellechasse was being got ready for launching on Wednesday, May 15.

Montreal, Que.—Denials are given to various particulars of a report sent out of this city to the effect that the railways and all-water transportation lines, operating between Montreal and the western end of Lake Superior, had resigned from the Canadian Freight Association, over the question of rates, and that a rate war would be the result. The report said that the lines remaining in the association were those controlled by the railways, and that the lines withdrawing were the following:—Inland Navigation, Canada Lake, Merchants' Mutual and Jacques. Mr. C. J. Smith, of the Richelieu & Ontario, which has recently absorbed other lines, stated that he had heard nothing of the resignation of any lines in which he was interested, while the Jacques Line also denied the report. At the Merchants' Mutual offices it was admitted that the Merchants' Mutual and Canadian Lake Lines had resigned from the association, but it was stated the question of freight rates did not enter into the matter, and that the reasons for the resignations were managerial ones of a private nature. The suggestion of an impending rate war was ridiculed.

PARS FROM CURRENT LITERATURE.

When the Psalmist said "in his haste" that all men were liars, he must have had a premonition of fanciful stories to be written in the year 1912, apropos of a certain awful disaster.

* * *

It begins to look as though such a large batch of medals will not be needed for the Titanic survivors, after all. Old John Bull has a way of making heroes show their scars before he hangs the medals on 'em.

* * *

It is not possible to provide for all contingencies at sea; accidents, even disasters, must occasionally happen. Let us see to it, however, that the means of safety which science has placed at our disposal are utilized to the full, and that if die we must at sea, it may be due to an Act of God and not to a default of man.

* * *

Lord Charles Beresford paid an overdue tribute to the engineers of the Titantic when he pointed out that her lights were burning till a few minutes before she sank. The place of the engineers in the Titanic's muster of brave men, he says, is "at the right of the line." The engineers died in darkness and silence below deck, inarticulate, but on duty till the end came.

* * *

The Rev. H. W. Cunningham, rector of St. George's church, Halifax, N.S., who accompanied the Minia on her quest in the Atlantic for bodies of victims of the Titanic disaster, mentions a circumstance worthy of special notice. "So far as could be judged by the ship's doctor," he says, "there was about one among the 17 bodies found, who died of drowning. In the case of the other sixteen, death was caused by exposure, and did not ensue for some four hours after the sinking of the ship."

* * *

A curious incident, which was, happily, unaccompanied by any serious results, occurred when the new White Star liner Titanic was starting on her maiden voyage from Southampton on Wednesday, April 10. About a mile from her berth she passed the Test Quay, at which a number of vessels, including the American liner New York, were standing. The suction or draw of the water due to the passage of the larger liner was such that the seven ropes, securing the stern of the New York to the quay, parted, and the latter vessel was swung out into the fairway. She was, however, immediately taken in hand by tugs and re-berthed before any further damage was done. The Titanic, which was unhurt, then proceeded on her voyage.

* * *

The sailing of the Titanic, the world's largest ship, on April 10, at noon from Southampton for New York, created a great amount of interest and enthusiasm amongst the thousands of spectators who gathered at the docks to watch the departure of the huge ship. Southampton may be considered to have established a record, inasmuch as on two consecutive Wednesdays the world's two largest vessels, the Olympic and Titanic, sailed from the port. The Titanic berthed in the Trafalgar Dock, which had been specially made for the accommodation of the two huge White Star boats, presented a most imposing appearance, and the White Star Company have every reason to be proud of the second twin ship.

* * *

Premier Asquith, in a brief statement in the House of Commons, on the day following the Titanic disaster, gave public expression to Great Britain's sympathy. After reading out to the members the messages from the White Star Company already published, the Premier continued:

"Perhaps the House will allow me to add this: that I am afraid we must brace ourselves to confront one of those terrible events in the order of Providence which appal the imagination, and make us realize the inadequacy of words to do justice to what we feel.

"We cannot say more at this moment than to give a necessarily imperfect impression of our sense of admiration that the best traditions of the sea seem to have been observed, and that willing sacrifices were offered to give the first chance for safety to those who were least able to help themselves, and of the heartfelt sympathy of the whole nation to those who find themselves suddenly bereaved of their nearest and dearest."

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main St., Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava St., Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy St., Kingston, Ont.; Captain James H. Martin, 259 Johnston St., Kingston, Ont.; John Corkey, 17 Rideau St., Kingston, Ont.; Captain Daniel H. Mills, 272 University Ave., Kingston, Ont.

The Awakening of the Great Lakes of North America

By Britton B. Cooke

The writer of this article treats this subject in an effective and highly fascinating vein; holding the attention of the reader in spite of himself and carrying him in very truth to the imaginative stage of being a participant in the practice, profit and pleasure derivable from being aboard one of our Great Lakes freighters.

A ROBIN appeared in a Montreal back-yard one day, and throwing out his chest, announced to all and sundry, but particularly to a lady of his acquaintance, that he had secured a suitable telephone pole from which to discourse to the earth beneath upon the delicacy of spring worms.

A slant of sun struggled over a British Columbia mountain top, and touching a piece of ice that lay sheltered high on the great hill, waked it and sent a stream of silver water swinging, now like a thread, now like a wind-tossed curtain, from one dizzy ledge of rock down to another, and so into the Kicking Horse.

A crow toiled heavily across an hundred acres of Manitoba farm, underneath which the germs of Number One Hard were waiting, like actors in the wings, for the Sun to give the cue for their appearance over-ground.

A steer in Alberta, answering some new impulse within himself, bawled lustily. A farm wife in Quebec prepared a row of sugar sap pails and set them out in the sun. A habitant whistled. An Arcadian looked at his apple trees; and a man in Halifax forgot his law books—for they breed great lawyers in that country—and nodded to a Conservative across the street with whom he had not been on speaking terms for twelve months.

It was Spring, and the same mysterious impulse that prompted the robin and the man in Halifax, revived life in an hundred grimy docks, a score of reprobate coal chutes, a hundred rusty freight boats, stone hookers and sailing schooners, and waked again—the traffic of the Great Lakes.

The Great Lakes themselves need no waking. There is a rime of frost around their edges while the winter lasts. The ice hummocks on the shore rise higher and higher with each christening of spray or each snow fall, but out beyond the edge of the shore ice, the lakes are never done tossing, and only the absence of the freight boats and passenger steamers shows the difference between winter and summer. It is only the shore that has to be awakened, where the wharves are deserted. The funnels of the most intrepid vessels on the lakes are covered with boards to keep out the snow. The captains are scattered. The mates and wheelmen have melted away inland. The engineer and his oilers are not to be seen. The stevedores, too, have gone the way of the deckhands, and the waterfront saloons of the Great Lakes languish.



A Freighter with a Double Tow Entering the St. Clair River from Lake Huron.

The same fire, however, that unbinds the purse of Nature and looses upon the world the vernal rhymer, that lights the black places under the leaves with the light of arbutus and hepatica, restores life to the lake shipping, lifts the lids from gallant funnels and recalls the wandering sailor to his place.

Importance of Great Lake Shipping.

The lakes are like five cups overflowing from one into the next, and from the last one into the St. Lawrence. Superior gathers the water from thousands upon thousands of square miles of soil, swallows rivers and takes tribute of a thousand lesser lakes. Then at



A Turret Boat Ploughing a Peaceful Course Through Lake Superior.

Sault Ste. Marie she thrusts what she has thus collected into Huron and so, into Erie and Ontario. The traffic at Sault Ste Marie has long since ceased to provoke wonder. Tonnage figures no longer impress the blase Canadian. He looks for greater ships, deeper waterways, stronger engines and cheaper freight rates; yet the waking of the lake traffic renews one's ability to wonder. From Montreal to Toronto, to Kingston, through the canal, across to Cleveland, thence to Windsor and Detroit, the Sault, Fort William and Port Arthur—these are the ports, and in each the spring revives the shipping, one of the vital elements in the business life of each port.



An Old Wind-Jammer Being Led Out of the River into the Open Lake by a Tug.

From scores of slips the lake freighters poke out their noses. A few new lines, a little paint and some new parts in the engine, and again they are ready for sea. The scattered crew drifts back. Some have been around the world; some have been working on ocean liners, and some have been doing laborers' work in inland towns. Captains have been idling at home with their families—loroing it over their wives and the kitchen range. Engineers have been similarly recuperating, or perhaps tending the engine in the home town's pumping station. Oilers have been doing all sorts of odd jobs and studying for their promotion. One at a time, or in two or three, they drift back to the harbor where they expect to ship again. Some take to strange vessels, under captains they did not know before; others return to the same old berth, the same old wheel house, the same room with the dead-light that won't close properly, the same old engine to watch with the same —— trick of trying to break the propeller blades in a dirty sea.

The first boats to clear with a cargo are a bit proud of themselves. There is a spirit of rivalry between the boats. The captain makes a few resolutions as to how he is going to save time in getting his cargoes aboard. The purser is going to be on watch for all the tricky bits of work the stevedores or the shippers may put upon him; but in the end they settle down to a regular jog trot. The round becomes the same pleasant old role that it has been for years.

There are the sunny days when the sun glistens on the deck. The captain reclines on a stool behind the binnacle and speculates through the binoculars what that far ship in the offing is carrying. The mate chews luxuriously. The purser decides to desert his books in the chart house, and fishing out his camera, takes more pictures of the ship's dog or the cook. The engine purrs along at the same old rate, and there is a splash astern as the bilge water goes over-



A Storm Cloud on the Great Lakes.

board or the cook throws out the potato peelings. Behind trails a long stain in the water left by the submerged ash-ejector.

Nightfall Afloat.

Evening drops along. The dark closes in from all around. Perhaps the shore is not too far away and the purser yawns as he contemplates the peaceful stone-hookers, manned by a man and a boy, a loaf and a jug of milk, lying flapping idly in an inshore breeze. Then the night falls swiftly and there is nothing between the bridge forward and the galley aft, but the signal lights and the shadows of steam winches, masts, hatches and deck cargo—if there be any—mixed up between.

Again, there is night on the Detroit, when the freighter lies snugly beside the spring-piles on the Windsor side. Vague shapes are abroad on the water. Stout cries from laboring hulks, ask for port or starboard. Somewhere out there the launch of the United States mail boat from Detroit is darting out to meet upcoming vessels and give them their mail in a bucket over the side. The ferry boats between Detroit and Windsor signal to strokes on certain bells, mounted on their bridges. The lights of Detroit flare high against the sky and yonder a black hulk pushes its way with a sniffling noise from its bows, upstream, with a cargo of frightened freight cars huddled together on its ample deck.

Approach of Season's Close.

There is the misty day on the River Ste. Marie, when the fog quivers with shuddering diapason voices of freighters feeling their way. There is the clean, wet, whistling day when the gale is from behind, and the cook, seeing a following wave astern, is behooved to pray lest the great green and white crest should topple over on the galley and ruin the day's cooking. There is the night when the wind is ahead and the heaves of her bows threaten to turn the cargo loose inside the hold, and give her a list to starboard.

Finally, toward the end of the season, or just before the insurance is up in December, there is the gale with snow accompaniment, when the passage between Isle Royale and Passage Island, outside of Thunder Bay, is none too wide, when the Old Girl gathers tons of ice on her bows, on her very decks indeed, and when the skipper, being a daring man, curses a little harder because he doesn't like the weather and declines to let it, or anything for that matter, see that he cares how hard she blows. That, however, is the end of the season.

Navigation has just opened. This last, that I have been talking about, has yet to come.



A Pioneer of the Lakes—One of the Last.

ENGINEER-IN-CHARGE OF THE LACHINE CANAL.

LIEUTENANT-COLONEL Henry Robertson Lordly, C.E., Montreal, Engineer-in-Charge of the Lachine Canal, was born at Rothesay, N.B., on December 12, 1868. He received his early education at the St. John Grammar School and at the age of twenty was Instructor in Drawing at the night classes of the Mechanics' Institute at St. John. In September, 1889, he entered the College of Civil Engineering at Cornell University, Ithica, N.Y. At the Dominion Exhibition at Toronto, he was awarded first prize for Studies in Perspective. He remained at Cornell University for four years, but in the summer of 1890 he was employed on the surveys of South Dakota, and in the vacation of 1892 on the construction of a hydraulic power plant near Ithica.

In 1893 he graduated with the degree of C.E., and was elected president of the Cornell Association of Civil Engineers. In the early part of 1894 he was employed in the C.P.R. bridge department at Montreal. Later he returned to the Maritime Provinces to undertake special work for a lighting syndicate. Returning to Montreal in 1900 he was appointed in the following year Engineer-in-Charge of the Lachine Canal, a position which he has held since that date. Col. Lordly has made a specialty of concrete work and holds a patent for a system of construction of concrete building members. He is a member of the Canadian Society of Civil Engineers, of which for one year he was Honorary Librarian.

Technical Productions.

A number of valuable technical papers have been written by Col. Lordly. Among

these may be mentioned:—"The Railway Transition Curve and Subaqueous Concrete Work," published in the Transactions of the Canadian Society of Civil Engineers: "Gas for Light and Power Purposes;" "Electrically Operated Lock Gates," and "Anti-friction Bearings," published in the Transactions of the Cornell Association of Civil Engineers. The latter paper was awarded the Fuertes Gold Medal, which is presented yearly by Cornell University for the best contribution to engineering knowledge. This has been won to date by only two Canadians, the other being Professor W. Kendrick Hatt, formerly of Fredericton.

Col. Lordly has served in three branches of the Canadian Militia, namely, the Infantry, Engineers and Corps of Guides. In 1885 he joined the 62nd Fusiliers as a bugler and saw active service in the N.W.T. in that year. He became a Lieutenant in the Charlottetown Engineers in 1898 and a Lieutenant in the Corps of Guides at Montreal, in 1904. In 1905 he attained the rank of Major and in 1907 successfully passed the Regular Army Promotion examinations in the technical military branches for his rank. He was promoted Lieutenant-Colonel in April, 1911, and was granted the Long Service Medal for the Auxiliary Forces a month later. At present, he is Commanding Officer of the Corps of Guides of the 4th division, Montreal.

Col. Lordly is a keen rifle shot, being the holder of the Governor-General's medal for special aggregate shooting, and a medal presented by the Lieutenant-Governor of Quebec.—Contract Record.



Lieut.-Col. Lordly, Montreal, Engineer-in-Chief of the Lachine Canal.

SUBSIDIES FOR SHIPBUILDING AND MARINE ENGINEERING.

MAJOR J. A. CURRIE, Mr. W. A. Hogg and Mr. James Smith, speaking at the Municipal and Board of Trade banquet, following the launching of the D. G. Steamer Estevan, each pointed out the necessity for Goverment assistance in the propogation of the shipbuilding and marine engineering industry. Emphasis was laid on the fact, that in the future, the trade of Canada would to a greater extent be carried on by water transportation means, and that, while in the past most of the encouragement and assistance had been given to railroading, shipbuilding and its allied interests had been left to work out almost entirely their own salvation.

NEW LINE OF STEAMERS.

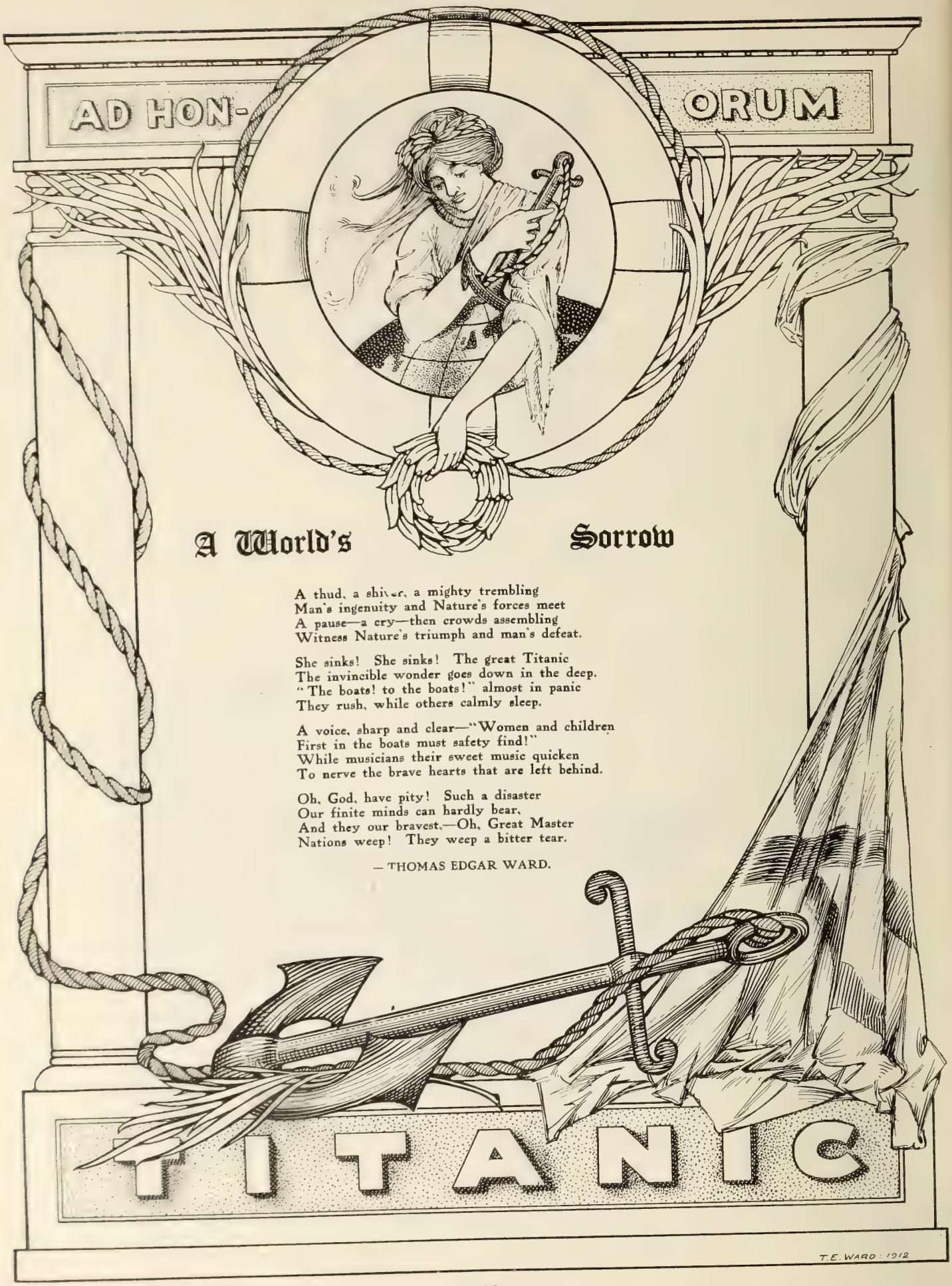
Under the title of the Canadian Interlake Line, Limited, a federal charter has been issued to Captain J. W. Norcross and his associates, by which a number of freight vessel interests will be consolidated into a corporate company, which will now be the most important member of the group of fleets trading between Montreal and Fort William, under the name of the Merchants' Mutual Line.

The vessels are all full "canal size," about 260 by 40 feet, and will constitute the most modern series of vessels in the trade. The boats are the Acadian, Calgarian, Canadian, Hamiltonian, and Indian, and the bulk freighters Renvoyle and A. F. McKinstry. The Hamiltonian is being built at Port Port Arthur, and the Indian, a motorboat, on the Clyde, Scotland.

The directors of the new corporation are Messrs. M. J. Haney, J. W. Norcross, Thomas Bradshaw, and J. F. M. Stewart, of Toronto;; A. M. Wolvin, Winnipeg; Henry Munderloh, Montreal; and E. H. Ambrose, Hamilton.



A Group of Freighters Just Before Navigation Opens.



A World's Sorrow

A thud, a shiver, a mighty trembling
Man's ingenuity and Nature's forces meet
A pause—a cry—then crowds assembling
Witness Nature's triumph and man's defeat.

She sinks! She sinks! The great Titanic
The invincible wonder goes down in the deep.
"The boats! to the boats!" almost in panic
They rush, while others calmly sleep.

A voice, sharp and clear—"Women and children
First in the boats must safety find!"
While musicians their sweet music quicken
To nerve the brave hearts that are left behind.

Oh, God, have pity! Such a disaster
Our finite minds can hardly bear,
And they our bravest,—Oh, Great Master
Nations weep! They weep a bitter tear.

—THOMAS EDGAR WARD.

MARINE ENGINEERING of Canada

A monthly journal dealing with the progress and development of Merchant and Naval Marine Engineering, Shipbuilding, the building of Harbors and Docks, and containing a record of the latest and best practice throughout the Sea-going World.

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Vol. II MAY, 1912 No. 5

THE PASSING OF THE TITANIC.

THE foundering of the Titanic in mid-Atlantic, with over 1,600 souls on board, may well be classed as the most materially and humanly disastrous marine event on record. Idolized, because believed to be the very acme of perfection in respect to unsinkability, comfort and luxury, the big vessel partook or had forced upon her many of the misapprehended attributes of the spoilt child. As to her unsinkable qualities, which the tragedy demonstrated did not exist, there is much truth in the trite remark published in one of our dailies, that they were little more than a ruse on the part of ocean steamship ticket sellers to inveigle people into purchase.

We have reason to feel proud that the best traditions of the sea were observed in full degree by those prominent in the upbuilding of our Dominion, and that as the ice-chilled waters began to make insistent demand for possession of the ship, these quit themselves like men, and died as heroes. In spite of calumnious statements and slanders which no stretch of language can properly qualify, the silent yet intensely appreciable sympathy of the whole civilized world goes out to the bereaved relatives of the ship's crew, from the captain down to the trimmer in the stokehold, and of those of the passengers of every class and position. All ranks and professions are the poorer for the loss of the activities of those who went down to death on the Titanic, but not in a long time has the honor roll of each had so many accessions as examples to those still in the struggle.

Not only is a world of sympathy being tendered the bereaved relatives of all who went calmly down to death, but, in addition, there is already being prepared the foundations for that undying monument to brave men and women, which will make our means of transportation not merely conveyances of more or less luxury, but at the same time veritable Museums of Safety. The big ship was never claimed by responsible people to be unsinkable, but we are afraid that the eye, the appetite and the long purse were more prominent in the catering arrangements than was the provision for the conservation of human life.

As was to be expected, and as is usual in even the most solemn events, individual, national and international, the clown, the speculator, the prevaricator and the all-wise-"guy" figured prominently in various features more or less directly connected with the disaster. Men, in a number of cases who know little more of the sea than how to spell the word, and still less of naval architecture and marine engineering, have blossomed into being as experts on any and every phase of the subject involved. Others, again, while seeing good reason for the project of building the Quebec bridge, fail to see any reason why 50,000-ton liners are necessary, and generously inform us that while their disadvantages are becoming apparent, there will be no cessation in their building so long as public feeling generally is in their favor. Questions affecting the manner of the vessel's sinking, the availability of the watertight compartments for the use of passengers, a dissertation on ship construction by a wireless operator, who on one occasion at least did his duty, and the definition of a brave man, are other features in the directions indicated. The most dastardly and cruel performance of all, however, was that which represented the Titanic as "being towed to Halifax, after the collision by the Virginian, and that all her passengers were safe."

It is an old saying that "one half of the world knows not what the other half is doing," which may be supplemented by the statement that "it seems to care as little."

INTERNATIONAL NAVIGATION CONGRESS AT PHILADELPHIA, U.S.A.

THE 12th Permanent International Association of Navigation Congresses will meet on May 23 and during the succeeding week at Philadelphia, Pa., U.S.A. Needless to say, the deliberations and discussions, pertaining to the multitudinous questions embraced within the scope of the association work, will, as a result of recent happenings, be earnestly and purposefully pursued.

Sections I and II, devoted to inland and ocean navigation respectively, and each in their subsections of questions and communications, already indicate the variety of subject and intensity of interest aroused. Being, as they are, the representative men of many countries, in marine work achievement, the conclusions arrived at by the delegates will determine to a marked extent the trend and magnitude of near future navigation and kindred projects.

OUR SOUVENIR NUMBER.

THE unexpected and appalling disaster which overtook the new White Star Line steamship Titanic, her pasengers and crew, so recently, called for our devoting a considerable amount of space in this issue, with a view to furnishing descriptive details of the vessel's leading features of hull, machinery and equipment, with all of which, we believe, our readers may not be too familiar. As a consequence, much other matter specially prepared for this number, has been held over until later.

PANAMA CANAL LOCK WORKING MODEL.

(Continued from page 112.)

are built up of steel as indicated above. In the model a wooden frame takes the place of the steel girders, and upon this, to represent the steel sheathing of the gates, has been tacked sheet copper by means of escutcheon pins, one to represent every rivet, in all between 110,000 and 115,000 pins. On the lock walls are the gate operating machines, the large bull wheels, with strut or arm stretching out to open and close the gates. These wheels and the mechanism that operates them are also to scale and an exact duplicate of the large machines, except that they are operated by a 1-15 horsepower motor. The motors are carefully rated so as to represent the motors in operating condition. They are synchronous in movement and, as indicating the probable results with the large motors and the large machines, it is noteworthy that they close and open the model gates in such unison that the gates come to miter, or to rest in their recesses, at practically the same time. The miter forcing machine is also on the model, run by a toy motor. In fact, the only detail, in which the gate and mechanism are not duplicated in the model, is the handrail over the top of the gate. This represented to scale is not raised and lowered in the model as it will be in the locks to make way for the towing lines. In order to obviate the natural tendency of the frame of the gates to warp, the wood has been used so that the grain runs in six distinct directions.

On the coping of the model are shown the tracks, rack and conductor slots of the electric locomotives for towing ships through the locks, as well as lamp posts, manholes, snubbing hooks and other small accessories to a large lock.

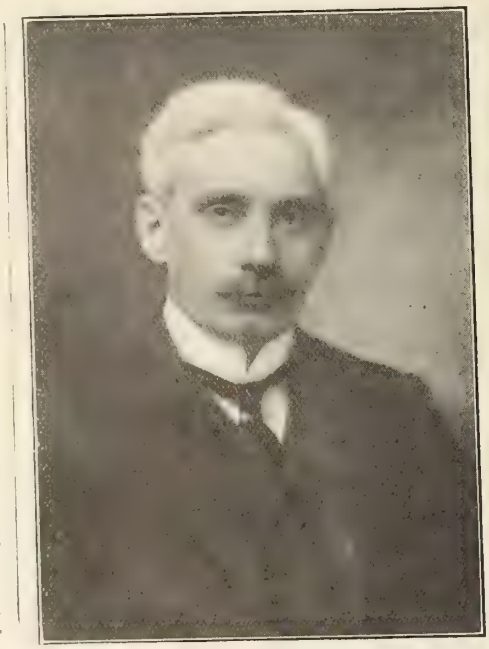
The chambers of the rising stem gate valve machines and of the cylindrical valve machines have been left open so that one may see the operation of the machinery. Each of the valves is run by a one-fifteenth horsepower motor, and the machines are equipped with the proper limit devices so that the operation is automatically controlled. The chain fender machine is built with the view of connecting it with a city water main.

PATROL OF BRITISH COAST.

UNDER a new scheme of defence, the destroyers of the British fleet commenced on May 1 a continuous patrol of the coasts of the United Kingdom. The whole available forces have been organized into eight flotillas; four being in full commission and four in reserve, with nucleus crews.

Of the four active flotillas, the first and second, composed of 36 of the newest and most powerful vessels, will have their base at the new naval headquarters at Rosyth, on the east coast of Scotland. Besides facing directly across to Germany, they will guard the northern exit to the Atlantic. The third flotilla will have its base at Harwich, another east coast station, and the fourth at Portland on the English Channel, where it will be available for work on any coast. At each of the bases named, there will be one reserve flotilla, while other destroyers will patrol other parts of the coast not covered by these.

No fewer than 165 destroyers are included in the new organization, besides eight fast cruisers, eight scouts, and eight depot and repair ships. Of this number, one-third are assigned to the North Sea, so that with 24 submarines with bases at Dundee and Harwich, the coasts of Britain should be well guarded.



F. W. Cowie, Chief Engineer, Montreal Harbor Commission.
Canadian Delegate to 12th International Congress of Navigation at Philadelphia.

WELCOME HOME FOR MR. J. BRUCE ISMAY.

ON May 11, a big crowd awaited the arrival of J. Bruce Ismay, managing director of the White Star Line, on board the Adriatic, and cheered him as he walked down the gangway with his wife, who had joined the ship at Queenstown, and accompanied him to Liverpool.

Mr. Ismay lifted his hat in acknowledgment of the reception, but excused himself from making any statement to the press, saying that he was still suffering from the strain of the disaster. He had, he said, already given a plain, unvarnished statement of facts to a responsible and adequate commission, and he thought that his evidence to be given before the British Court of Inquiry should not be anticipated. He expressed his gratitude for the cablegrams and letters he had received from public societies and private friends, conveying their sympathy with and their confidence in him during "the greatest trial of my life."

Mr. Ismay was pale and haggard, and appeared much touched by his reception.

PANAMA CANAL—ATLANTIC TERMINAL DOCKS.

IN the construction of the Cristobal terminal docks, the temporary trestle for the mole, from which the piers will extend toward the anchorage basin, has been built to its full length of 1,720 feet. The mole proper will consist of a fill 250 feet wide, rising to 10 feet above mean sea level. The material for the fill is rock secured from borrow pits near Mount Hope. Docks 15 and 16 come together at an angle, enclosing Cristobal Point; dock 15 being practically an extension of dock 11.

The work of driving steel caissons for dock 16, is 70 per cent. complete; that is, 10,500 lineal feet are in place. It is expected that all caissons will be in place on this dock in three weeks' time. No attempt will be made to place caissons on dock 15 on account of interfering with the work at the cement dock —dock 11 extension. The work of placing caissons for pier 17 is 35 per cent. complete, with 6,000 lineal feet of caissons in place. The extension of this pier into deep water has been delayed on account of shortage of long piling.

The dredge Mindi started work excavating the slip between dock 16 and pier 17 on April 22. It is intended to have this dredge take one cut along the face line of dock 16 to elevation 41 feet below mean sea level. This first cut is largely a construction measure and will involve moving about 41,000 cubic yards. If the services of the dredge can be spared, the entire slip will be dredged to 41 feet, which involves moving 310,000 cubic yards.

The Buffalo Commercial says that the British investigation into the wreck of the Titanic seems to be nothing more than a supplement to the investigation by the United States Senate Committee. Certainly it will not be the comic supplement.

Recent Designs of Special Dredging Machines

By C.T.R.

The development and improvement of Canada's Waterways and the equipment of those harbors which have given her prominence in the world's shipping to-day, has been largely due, as it has been likewise in other countries, to achievement in dredge design, construction and operation. The subject is one which appeals to all sections of marine men.

WE illustrate several examples of special dredging machines from recent designs by A. W. Robinson, M. Inst., C.E., M. Can. Soc. C. E., of Montreal.

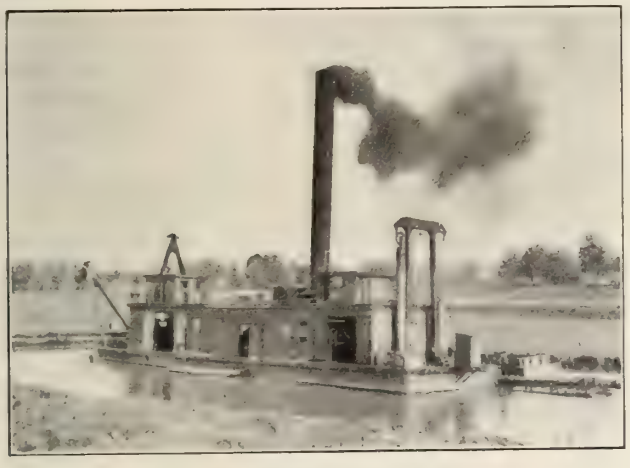


Fig. 3 — 20 Inch Hydraulic Dredge.

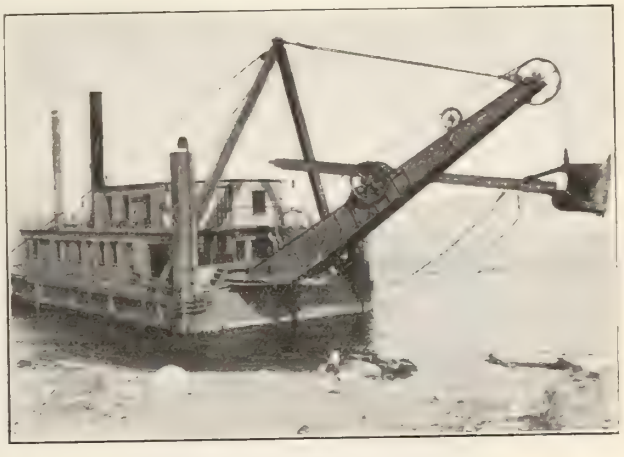


Fig. 4 — General Purpose Dipper Dredge.

Light Draft Self Propelling Dredge.

Fig. 1 shows a light draft self-propelling dredge built to the order of the Crown Agents for the Colonies for River Niger Navigation, by Lobnitz & Co., Ltd., Renfrew, Scotland. This dredge is designed to cut a channel the width of itself, through a sandbar, at a rate of advance of 50 to 150 feet per hour, depending on the section; thus affording quick relief for the passage of boats during the low water season. It is similar in principle to the great Mississippi dredges, many of which were designed by Mr. Robinson, but in important points is an improvement over Mississippi practice. It is capable of setting its own anchorages, which consist of steel piles sunk in the sandy bed of the river by water jets, and has a floating discharge pipe, which steers itself at right angles to the current by the reaction of the issuing stream.

The main pumping engines, of the triple expansion high-speed enclosed type with forced lubrication, built by Bellis & Morcom, Birmingham, England, develop 700 h.p. at 320 revs. This type of engine is admirably suited for work in tropical countries, as it requires so little skilled attention. The pump is of Mr. Robinson's special design for high speed dredging work. The hull is 180 feet long, 35 feet wide and 6 feet deep. The main deck is occupied by the machinery and quarters for native crew, while the officers and white crew have accommodation on the upper deck. On trials, this dredge developed remarkable efficiency, showing a capacity of 1,100 cu. yds. per hour; while as a light draft steamer, it has frequently served as a dispatch boat and troop-ship, on the river Niger.

Hydraulic Dredges.

Fig. 2 shows the large sea-going hydraulic dredge "Jinga" built for the Bombay Port Trust, for harbor extension purposes. This vessel is of the hydraulic type for land reclamation and has pumping machinery of 3,500 h.p.; giving a capacity of 20,000 cu. yds. per day delivered through a pipe-line 42 inches dia. and 4,500 ft. long. It can make a cut 500 ft. wide and 35 ft. deep at one operation. It is fitted with cut-

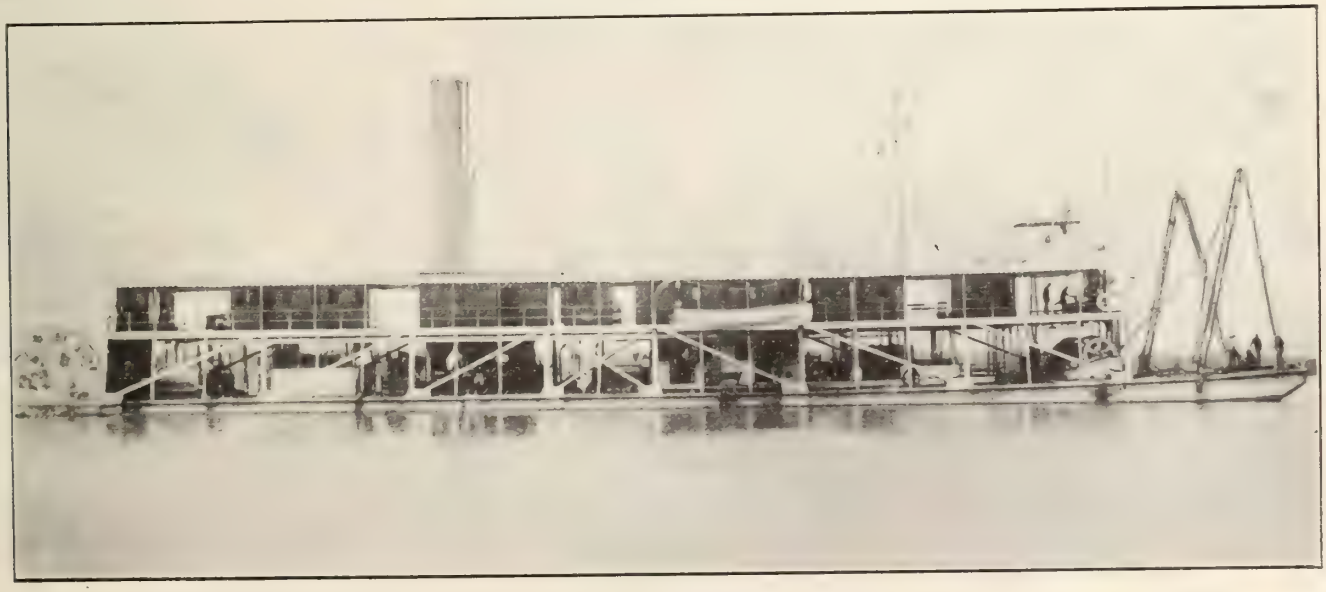


Fig. 1 — Light Draft Self-Propelling Dredge.

ter and suction apparatus of Mr. Robinson's latest design, and to the effective work of this cutter the exceptional performance of this dredge is due.

Fig. 3 shows a 20-inch hydraulic dredge on the New York State Canal, cutting the entire prism of the dredge at one operation. This is a type of which Mr. Robinson has designed a large number, being extensively in demand. It makes a radial cut in front; a spud near the stern serving as a pivot. This dredge was built for the Acme Contracting Company by the American Locomotive Co., of New York, and has made a record of 228,000 cu. yds. per month.

Dipper Dredge.

Fig. 4 shows a small general purpose dipper dredge built for the Canadian Development Co. by the Montreal Locomotive Works. This shows Mr. Robinson's distinctive type of boom with straight taper and solid turntable at the bottom, which makes at once a simple and rigid construction. This type of dredge has proved most satisfactory in service, and similar ones have been built for the Cuban Government, the River Nile and Panama Canal. Two large dredges of this type are now nearing completion for the Cape Cod Ship Canal, and another for the Department of Public Works of Canada.

This design of dredge embodies the principles developed by Mr. Robinson in the wire-rope shovel for land service known as the "Atlantic Type." This type of shovel is now widely adopted and has many advantages over the earlier chain-type. Mr. Robinson has been identified since 1886 with the development of the now universally recognized American type of steam shovel, as built for many years by the Bucyrus Company of South Milwaukee, Wis. The Panama Canal has been almost wholly excavated by shovels of this make.



Fig. 2 — Sea-going Hydraulic Dredge.

Shipping Incorporations

The MacKay-Hall Steampship Co. Ltd., which includes A. D. MacKay, John W. Nesbitt and J. G. Gauld, of Hamilton, has secured a Dominion charter. The company's capital is fixed at $100,000, divided into 1,800 shares. The head office is at Montreal.

The Toronto and Niagara Navigation Co., with a capital of $2,000,000, with head office at Toronto, has been incorporated under a Dominion charter. The incorporation was secured through a Toronto law firm.

The Union Navigation Co., Ltd., with a capital stock of $50,000, has received a Dominion charter. The head office is at Toronto.

The Mississauga Towing Co., Ltd., has been incorporated. Its headquarters are to be at Blind River and the incorporators are: Messrs. C. A. Eddy, J. R. Stover, J. V. Sharkey, R. S. Eddy and R. T. Stover. The capital stock of the company is $15,000 divided into 150 shares.

OIL ENGINES FOR WARSHIPS.

THE British Admiralty is obviously awakening to the fact that oil-driven engines are to be looked upon as a factor likely to have considerable bearing in the naval ships of the future, and that it is very necessary that as many officers as possible should receive instruction in the manipulation of the machinery, particularly in the smaller class vessels, likely to predominate at no very distant date. The move on the part of the Admiralty is shown in a circular letter just issued, and announces that new scheme officers who elect to specialize in the engineering branch will be eligible for command of submarines. This is done to popularize the engineering part of the new scheme of entry, but it has really a far wider significance.

All submarines now building have Diesel type heavy oil engines, identical with those which would be used in big motor warships. Although the command of a submarine entails many duties other than those connected with motors, yet efficiency is very much bound up with the care of these. Every submarine officer is intimately acquainted with the details of his motive power.

The selection for submarines, therefore, very clearly indicates that the Admiralty contemplates the early disappearance of steam in favor of the internal combustion type of engine; and is very wisely seeing to it that there shall be no danger of a replica of the old Belleville boiler trouble. When Bellevilles were adopted, it will be remembered, a great deal of trouble was met with because there was a grave deficiency of engineer officers trained in the use of water-tube generators. Thanks to the new order, when the motor warship comes into general use, there will be a large supply of engineer officers thoroughly familiar with the new motive power. The foresight of the order is admirable. It is also an interesting indication of the trend of things. — T. E. S.

U.S. Dredge "Corozal."

THE dredge Corozal, which arrived at Balboa on March 27, made its trip from the Clyde in 117 days without serious mishap. Its log shows a total of 12,064 miles, and actual sailing time of 96 days, an average of 125 miles a day. On leaving the Clyde on December 1, the ship struck heavy weather at once, and all through St. George's Channel and in the English Channel was buffeted about by heavy gales and seas. To see it alongside the wharf at Balboa one would think the dredge, with its ladder frame standing high above the deck, would be very top heavy and dangerous to handle in heavy seas. This proved not to be the case, and it rode so evenly that at no time were the dishes displaced on the officers' mess table.

Details of Ocean Voyage.

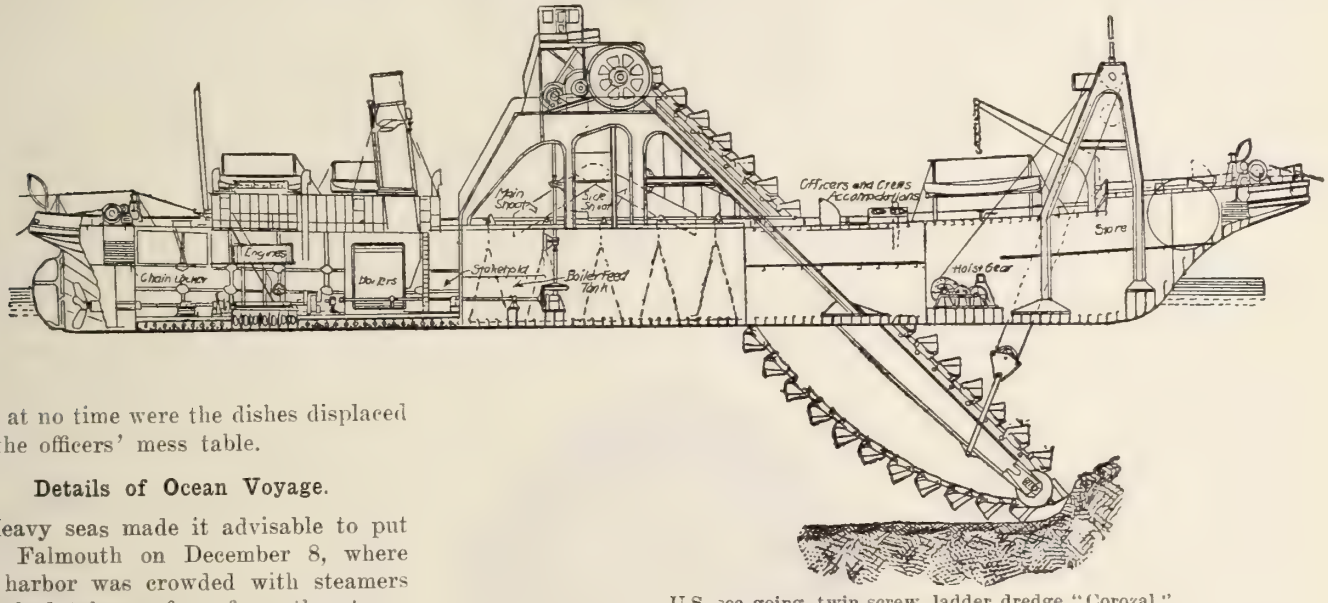
Heavy seas made it advisable to put into Falmouth on December 8, where the harbor was crowded with steamers that had taken refuge from the storm. The delay was taken advantage of by coaling and by slight repairs to the damaged frames in the forecastle; on completion of which the journey was resumed on December 29. From this point, stops amounting to 15 days were made, one day at Funchal, one at St. Vincent, one at Bahia, two at Montevideo, four at Punta Arenas, two at Coronel, and four at Callao. The best run was 198 miles in 24 hours made on two successive days between Callao and Panama. Through the Strait of Magellan it was necessary to anchor at night, and the best run was 94 miles in 24 hours.

At Callao the ship's hull was painted outside, and the dredge looked on arrival at Balboa as though it had never been a day at sea. Except for the storm encountered during the first week, the voyage was without incident, all the machinery working satisfactorily, and no accidents occurring. The master, Capt. Wm. Rodick, who brought the Corozal to the Isthmus, has been in the service of the builders for thirty-seven years, and so far as he knows this is the longest voyage ever taken by a dredge with all her superstructure in place ready for digging.

Hull and Machinery.

The Corozal is a twin-screw hopper dredge built of steel, 268 feet 9 inches overall length; 259 feet between perpendiculars; load water line length, 239 feet; molded breadth, 45 feet; depth, 19 feet; draft when light, 12 feet forward, 14 feet 4 inches aft, 13 feet 2 inches mean; draft when loaded with 1,200 tons of spoil, 14 feet 3 inches forward, 17 feet 4 inches aft, 15 feet 9½ inches mean.

There are two Scotch marine boilers 14½ feet diameter and 10½ feet long, having 2,022 square feet heating surface and 66 square feet grate area each. Two main engines propel the ship or run the dredging gear. They are of the marine, triple expansion type, with cylinders 17, 27 and 43 inches diameter and 27 inches stroke. With steam at a pressure of 180 pounds per square inch, they develop a total of 1,893 horsepower. Independent steam driven air, circulating and feed pumps from a part of the auxiliary equipment in the engine room. There are two condensers with a cooling surface of 1,564 square feet each. The propellers are of cast iron, 9 feet 3 inches diameter and 12 feet pitch. The dredge is fitted with its own refrigerating and electric lighting plants.



U.S. sea going, twin screw, ladder dredge "Corozal."

Dredging Equipment.

The ladder, 115 feet long and weighing 100 tons, upon which the continuous chain of buckets revolves, is built up of structural steel girders. With buckets upon it, the total weight is 240 tons. The bull wheels, by means of which the turning power is applied to the chain, weigh 25 tons each, the top tumbler, 15 tons, the bottom 13 tons. Two sizes of bucket are provided, one of 54 cubic feet for excavation in soft material, and weighing 2 tons 8 hundredweight, and a small 35 cubic feet strong bucket for digging in hard material, weighing 2 tons 14 hundredweight. The weights given are for buckets alone; when combined with links and pinions each weighs 4 tons. They are constructed with cast steel backs, pressed plates of mild steel for bodies, and tempered lips of manganese steel There are 39 in a chain, and ten spares of each kind were brought over by the Corozal.

Dredging Work Required.

The work for which the dredge is to be used is the digging of about four million cubic yards of hard material, rock, clay, and boulders, from the Pacific entrance of the Canal between Balboa and Mirafloes Locks. This is excavation that cannot be done by the ladder or dipper dredges now in the service, because of the character of the material and the depth at which it is found. The ladder dredges now in use are old French equipment, and the dipper dredge at the Pacific entrance, although a modern American dredge cannot do the work required.

The Corozal has a centre well ladder so that it can make its own flotation; that is, it can dig into a bank ahead, and when the ladder makes an angle of 45 degrees with the vertical, excavation can be caried on at a depth of 50 feet. At this depth the dredge is required to dig 1,200 cubic yards of soft material in an hour, and on the test referred to below, a better showing than this was made. With her hopper containing 1,200 tons of spoil and her bunkers loaded with 100 tons of coal the ship must be able to make ten knots an hour, and this test also was successfully met.

The new dredge is equipped to deposit its dredgings in a hopper capable of holding 27,500 cubic feet, with a hydraulic dumping apparatus, or into barges tied alongside, the section amidships, herewith, showing the chutes by which the discharge overboard is made. The method of discharging into barges will be especially useful in excavation in Culebra Cut or at any other interior point where the distance from a suitable dumping ground is so great as to make trips by the dredge itself uneconomical.

The only sea-going ladder dredge recently in the service was the Gopher, at the Pacific entrance. Compared with her the Corozal has buckets of about five times the capacity, is able to excavate three times as much in an hour, and to dump from its own bins, whereas the Gopher discharges only into barges. Including the Gopher, there are now four rebuilt French ladder dredges in operation in the Pacific entrance, and the new dredge will have a capacity equal to that of all of them.

CHICAGO DRAINAGE SCHEME.

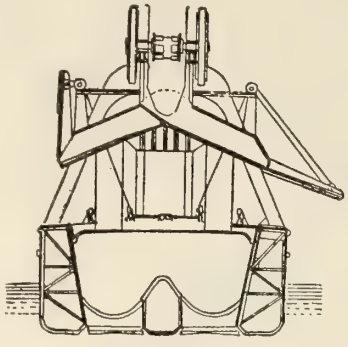
The Corozal was built by William Simons & Company, Ltd., Renfrew, Scotland. The contract was let on August 13, 1910, after the U. S. President had found the bid of an American firm excessive. In response to the invitation for bids, three were received: That of the Union Iron Works, San Francisco, was $874,146, with delivery in 14½ months; that of Lobnitz & Company, Ltd., Renfrew, was $449,000, with delivery in 365 days; and that of William Simons & Co., also of Renfrew, was $399,340, delivery to be made in 365 days. The difference between the Union Iron Works and that of the lowest Renfrew firm was $474,806, an amount considerably greater than the whole bid of Wm. Simons & Company, Limited. In view of this fact the chairman and chief engineer recommended that the contract be awarded to the lowest bidder, and the President acted upon this advice.

An inspector of the United States Government was present at the works during the entire construction period. Labor troubles caused a delay of several months. The dredge was launched on September 13, 1911. After completing successfully a series of tests, digging in hard and soft materials, it set out upon its journey to Balboa on December 1, but was compelled, as already stated, to return to Falmouth on account of bad weather.

The contract with the builder stipulates that he will deliver the dredge at Balboa after satisfactory tests, and will guarantee the maintenance for a period of six months after delivery; that is, a survey made after six months' operation will determine whether any parts have suffered under wear, and should there be such they will be replaced without cost to the United States Government.

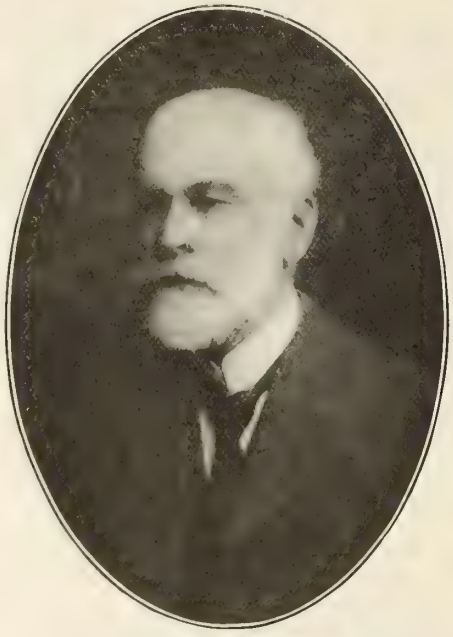
The Contract Tests.

The test included digging in mud, digging in boulder clay, speed and endurance, and the results showed that the requirements had been fully met. Working in mud the dredge excavated 1,114 tons of material in 41 minutes at



Section amidships U.S. dredge "Corozal."

depths ranging from 40 to 50 feet, a rate of 1,482 cubic yards an hour. The average of three loads in this test was 1,320 cubic yards an hour at depths of from 33 feet 6 inches to 50 feet 3 inches. In the speed trials, with 1,168



JOHN KENNEDY, C.E., MONTREAL

Canadian delegate to 12th International Congress of Navigation at Philadelphia.

tons of spoil, 130 tons of coal, and all stores, etc., on board, the average for 3 runs was 9.678 nautical miles an hour. The tests in boulder clay were made in Belfast harbor, three loads being taken. The weight of the material averaged 128, 127.8 and 133.3 pounds per cubic foot and the average excavation for the three loads was 515 cubic yards per hour by actual measurement, or, determined by the displacement of the dredge, 523 cubic yards. In the last load an actual dredging depth of 53 feet 2 inches below the surface was reached. The tests in boulder clay are typical of the work the Corozal will do at the Pacific entrance.

The formation of the bottom at the dredging site varied greatly. Hard, stiff red clay was encountered at depths under 38 feet, which averaged 126 pounds per cubic foot. Boulder clay was encountered at depths from 38 to 43 feet, in which were gravel and stones varying in size from that of a walnut to a stone of a foot or more in diameter. The weight of the boulder clay averaged about 135 pounds per cubic foot. At depths from 43 to 48 feet a conglomerate mass of gravel and small stones mixed with boulder clay, such as found above, was encountered. Below a depth of 48 feet, a hard compact red sand was met, in which were stones and gravel, weighing about 141 pounds per cubic foot. This was very difficult material for the dredge to handle.

While dredging in the boulder clay before reaching sandy material, the buckets were well filled, and the dredge appeared to handle the material very well. During the last load the engine stalled repeatedly without showing any undue strain on the dredging machinery. All the dredging gears and bearings worked well with the exception of the forward bearing of the port driving gear shaft in the engine room, which heated slightly and required water service.

CHICAGO DRAINAGE SCHEME.

THE Canadian opposition to the proposal of the Chicago drainage district to take an increased supply of water from the Great Lakes, through its canal, came before the U.S. authorities at Washington, recently. It was declared that the depth of water in the Montreal harbor would be affected 10¼ ins., if the proposal were carried into effect, and that last year, under the then existing conditions, two ocean-going vessels sacrificed 8,340 tons of cargo capacity, through low water. Arguments were also presented to show the effect on water levels in Kingston and Toronto harbors, and the lake levels generally. The following representatives were present: F. King, counsel, Dominion Marine Association, who also filed a protest from the Kingston Board of Trade; A. A. Allan, Allan Steamship Line; F. E. Meredith, Shipping Federation of Canada; D. Seath, Montreal Harbor Commission; R. W. Reford, Montreal Board of Trade; F. S. Spence, Toronto Harbor Commission, and G. T. Blackstock, K.C., representing various Niagara River interests.

Marine News From Every Source

British Columbia

Victoria.—The British-American Construction Co. have been awarded contracts for the construction of the piers, landing stage, building platform and launching ways in connection with the construction of the G.T.P. drydock at Prince Rupert.

Esquimalt.—A large number of men are now employed at the yards of the B. C. Marine Railway getting things ready for the construction work on the new C. P. R. Princess, which is to replace the steamer Tees. The slip on which the big coasting vessel is to be built, will be put together soon, and everything made in readiness for an early start upon the arrival of the material from New York and the United Kingdom.

Prince Rupert.—A Grimsby firm has ordered three first-class modern trawlers for service in British Columbia. The liveliest interest is being manifested by the Grimsby fishing industry in the possibilities of the British Columbia enterprise. W. Doughty & Son and Sir G. Doughty are now making arrangements for establishing a large trawling centre at Prince Rupert.

Prince Rupert.—An agreement has been made between the Grand Trunk Pacific Railway and the Dominion Government for the construction of a floating drydock at Prince Rupert, to cost approximately $2,200,000, and instructions have been given to proceed with the work. The construction of the drydock is in charge of the Grand Trunk Pacific engineer, Mr. Wm. T. Donnelly, who has drawn the plans and specifications and who will be in charge of the work.

Vancouver.—It is reported that the Royal Mail Steam Packet Co. will establish a service between Europe and British Columbia, via the Panama Canal; Victoria being the Canadian port.

G. T. P. Coast Service.—Capt. C. H. Nicholson, manager of the Pacific Coast service of the Grand Trunk Pacific Railway, announces that the time has come for the establishment of a regular steamboat service to Goose Bay, B. C., and that this will probably be done by making a connection north and south bound with one of the larger steamers, although the alternative plan of sending one of the larger steamers direct to that point is also being considered. This change in schedule will not come into effect until about the middle of June, when the Prince Rupert is again in commission. It is also announced that a regular schedule will be drawn up, taking in the principal points and canneries' calls of the Prince Albert, which will leave Victoria and Vancouver fortnightly on regular sailing days. These calls are to be at Alert Bay, Rivers Inlet, and canneries; Namu, Ocean Falls, Bella Bella, Swanson Bay, Lowe Inlet, Claxton, Port Essington, Skeena River canneries, Prince Rupert, and Naas Bay. The Prince Albert has a large carrying capacity in addition to considerable passenger accommodation.

Prince Rupert.—The report for February of arrivals and departures of steamers at Prince Rupert, recently received at headquarters of the Grand Trunk Pacific Railway in Montreal, shows 60 arrivals and 56 departures at that port for the month, as compared with 50 arrivals and 53 departures in January.

MEMORIAL TO TITANIC'S ENGINEERS.

The Institution of Engineers and Shipbuilders in Scotland have resolved to erect a marble tablet in the entrance hall of their rooms in Elmbank Crescent, Glasgow, recording the names of the engineering staff who perished at the post of duty.

The Great Lakes

Toronto.—The Department of Marine and Fisheries at Ottawa will assign a special inspector for Toronto to enforce the regulations in regard to the number of passengers carried and the life-saving equipment on board steamers. Mr. Alex. C. Lewis, on behalf of the Harbor Commission, wrote the department, stating that boats plying to and from Toronto were frequently overladen and not equipped in accordance with the requirements. A reply was received to this communication stating that the department was taking up the matter and appointing more inspectors, one of whom would be assigned to Toronto.

Southampton.—John Logie, captain and owner of the fishing tug John Logie of this port, was recently lost overboard and drowned about thirty miles out from here. No person on board saw the accident, and he was not missed for over two hours. Search was immediately made in the vicinity, but without result.

Sault Ste. Marie.—Water was let into the Weitzel lock on May 2, for the first time this season, and the lock went into commission with a draft of 13 feet. Concrete work on the new lock was also started.

Fort William.—The first boat to reach the north shore of Lake Superior was the Standard Oil Co.'s tug Security, which made the inner bay on the afternoon of May 2, with a barge in tow from Sarnia.

Ottawa.—For the trip which the Duke and Duchess of Connaught are to make to the Maritime Provinces this summer, the Government steamer Earl Grey is to be specially and elaborately fitted up. Capt. Pelletier, of the Montcalm, has been sent to Pictou to bring the vessel up to Quebec for repairs after her accident, and for proposed alterations. In addition to the quarters of the Governor-General, the officers' rooms on the upper deck will be converted into a Royal saloon. The Grey will be manned by a special crew of naval officers and men, and commanded during the trip by one of the Royal Navy officers.

Toronto.—The Polson Iron Works have arranged with the Harbor Commission for the lease of the property on which that firm is building a $1,000,000 dry dock.

Toronto.—A Lyle signal gun and a fast motor boat are part of the equipment of the new life-saving station to be established on Toronto Bay. The city and the Dominion Government will share the cost.

Ottawa.—The Canadian delegates to the International Congress on Navigation, to begin on May 23 at Philadelphia, will be : Col. Anderson, chief engineer

of the Marine Department: John Kennedy, consulting engineer; J. S. Armstrong, C.E., Fredericton; and F. W. Cowie, chief engineer of the Montreal Harbor Board. They will afterwards traverse the Canadian waterways from the Soo to Quebec.

Collingwood.—The big freighter being built by the Collingwood Shipbuilding Co. for the Chicago & St. Lawrence Navigation Co., is to be named St. Lawrence. It is expected that the steamer will be launched in November.

Toronto.—The competition which has resulted in a cutting of freight rates detrimental to both companies was effectually done away with when arrangements were recently completed between the Merchants' Mutual Line and the Canadian Lake Line regarding freight charges. The printed tariff rates will be strictly adhered to in the future.

Toronto.—The first Niagara boat left Toronto on Saturday, May 11, when the Corona sailed for Lewiston and Niagara.

Toronto.—The Toronto Ferry Company has taken possession of the old Turbinia dock, and there is excellent accommodation; the crowding at the Bay Street wharf being practically done away with.

Toronto.—The Harbor Board is rebuilding the Brock Street dock from the water up, and will put it in first-class condition. The sand pumping in the Bay is progressing satisfactorily, over 8,400 cubic yards having been dredged and placed in Ashbridge's Bay.

Port McNicholl.—The great lakes service of the Canadian Pacific for 1912 was inaugurated on May 4, when the steamship Assiniboia left this port at 5 p.m. for the Soo, Port Arthur and Fort William. This was also the inauguration of the new route from Port McNicholl, where the company has erected terminals on the eastern portion of the great lakes. It will be the leading grain and package route between Eastern and Western Canada. The new line cuts off 120 miles of rail haul between the lakes and ocean navigation at Montreal, and 20 miles between the lakes and Toronto, while the improvement in the reduced grades on the road will more than double the carrying capacity of each train. Coincident with the opening of this new route was the running of special expresses, which leave Toronto every day in the week, except Friday and Sunday, at 12.45 p.m. Similar specials are run from Port McNicholl on the arrival of the company's steamers from the West. This is a marked advance on the train arrangements of previous years, when specials were run only during the season of heavy tourist travel. In addition to the steamship service by Port McNicoll, there will be a sailing every Wednesday from Owen Sound on the arrival of the Canadian Pacific afternoon train from Toronto.

Collingwood. — Crangie, Hagerty & Wright, of Toronto, have placed an order with the Collingwood Ship Building Co., Collingwood, Ont., for a 9,000-ton steamer to be 510 feet over all, 490 feet keel, 56 feet beam and 31 feet deep.

Port Colborne.—The new steamer Yaguez, owned by the Ocean Freight Line, New York, passed through on her way to New York to be placed on the Porto Rico route. The Yaguez was built by the Great Lakes Engineering Works at Detroit, and is a ship of 4,000 tons, with wireless equipment and all modern improvements. She will be followed in about ten days by another new ship, the Rayanou, exactly the same; also for the Porto Rico trade.

Fort William.—The first regular passenger steamer of the season reached the head of the lakes on May 5; the Hamonic arriving at Fort William at 2.30 on the afternoon of that date.

Toronto.—Passengers on the steamers that ply on the St. Lawrence and the upper lakes will this summer be able to form an opinion as to the effect of monopoly on steamship rates. The big merger at present includes the Richelieu & Ontario, the Niagara Navigation, and the Northern Navigation Companies.

Fort William.—The second freighter being built here by the Western Dry Dock and Shipbuilding Co. will be named the Calgarian.

Toronto.—The American steamboat officers were recently in the city inspecting all vessels traveling to American ports. The Corona, Chicora, Chippewa, and Cayuga were inspected and found satisfactory.

Owen Sound.—The C. P. R. fleet sail-
the steamship service by Port McNicholl,
ed on May 1, for Port McNicholl, the new steamship headquarters. The squadron was given a good send off, over one thousand citizens being at the dock to bid them farewell. The flagship, Assiniboia, Commodore Louis Payette, sailed out at 8 o'clock, with pennants flying, and a salvo of salutes from the factories along the shore of the harbor. The Keewatin, Capt. M. McPhee, followed the flagship, and the Alberta, Capt. Davis, the Manitoba, Capt. McIntyre, and the Athabasca, Capt. N. McCannell, completed the fleet. On board the Alberta were one hundred and fifty freight porters, who were in the employ of the company, and who will work in the freight sheds at the new steamship terminal. This is practically the last of the C. P. R. steamers so far as the local port is concerned. The Manitoba will make weekly calls for local freight and passengers, otherwise the association of the C. P. R. liners with Owen Sound is a thing of the past.

Toronto. — The Toronto Board of Trade's marine section has elected the following officers:—Chairman, F. Barlow Cumberland; deputy-chairman, J. T. Mathews; secretary-treasurer, F. G. Morley; Executive Committee, Capt. S. Crangie, E. Rogers, R. E. Gibson, A. A. Wright, F. Plummer and G. Sommerville.

London.—The steamer Forest City, which was operated last season between Port Stanley and Cleveland, and which, it was thought, would continue the connection for passenger business across the lake, has been sold to a Fort William syndicate. As a result, the service between the two ports will now be closed. The Forest City was recently purchased from last year's owners by a syndicate headed by R. E. Eckert, of London, but while the boat was being refitted for the opening of the season, the Fort William deal was arranged. It is understood that the bondholders of the boat break even, while the stockholders lose all they invested in her.

Collingwood.—The Inland Line steamer Empress of Midland, which was ashore at Cape Croker, came into port a few days ago in charge of the wrecking tug Traveller. The steamer touched bottom from stem to stern, and it was necessary to use hydraulic jacks to effect her release. Her hull is badly damaged, and at least twenty plates will have to be renewed. An inspection was made on behalf of the underwriters by Mr. Hugh Calderwood. The repairs to the steamer will necessitate her remaining in drydock for two weeks, and will involve a heavy expenditure. The injured steamer is one of the large freighters of the Inland Line, and was on her first trip of the season, being bound for Fort William to load grain.

Collingwood.—The steamer Stadacona, one of the 500-foot lake freighters, came out of drydock recently after repairs. The injury was done in Duluth harbor, where the rudder came in contact with a sawlog, twisting the rudder post and doing other damage.

Navigation Deal Closed. — Sufficient Niagara Navigation Co. shareholders having accepted the Richelieu & Ontario Navigation Co. offer of $200 per share, formal transfer is being made to Mr. C. F. Smith, managing director of the Richelieu Co. Mr. Smith will decide on plans of operation for the season.

Sunday Lake Sailings.—The absorption of the Niagara Navigation and the Hamilton Steamboat Companies by the Richelieu and Ontario Navigation Co will mean many progressive moves by the big organization. One of the important matters under consideration is the question of Sunday boats to Lewis-

ton from Toronto. An indication that points this way is the fact that the season tickets to be issued by the new company for the Niagara lines state that they are "not good on Sunday." As far as can be learned, the time tables will be about the same as last summer, and few changes will be made in the executive staff.

Leamington.—Owing to complaints having been made to the Department at Ottawa that fishermen other than British subjects were operating along the shore, a justice of the peace was sent to the Point with an affidavit which all those engaged in the fishing business were required to sign. The affidavit contains the following:—"First that I am a British subject; second, that during the years 1911 and 1912 I had a license signed to me under the Ontario Game and Fisheries Act of King Edward VII., authorizing me to fish a certain number of nets; third, that no person not a British subject has any proprietary interest in the nets, gear, boats, and appliances used by me on my behalf." All the fishermen signed but one. The evidence was taken up that no unqualified person could fish in Canadian waters. If it has the effect of closing up business relations with Capt. Joe Post, the United States Government will have to take the matter up.

Brockville.—The steamer Phoenix, of the Hall Coal Company, Ogdensburg, went ashore on Little Round Island, about a mile below Clayton, during a heavy fog on May 10. Another boat of the same line pulled her off with little damage.

Toronto.—The launching of the new Royal Canadian Yacht Club ferry, to run between the city wharf and the Island clubhouse, will take place the first week in June. The boat is now rapidly nearing completion in the yards of the Polson Iron Works, and it is announced by the manager that everything would be ready to have the launching at the beginning of June. The boat is entirely of steel, with the exception of the cabin, and will cost in the neighborhood of $15,000.

Toronto.—The Niagara Navigation Company opened their season on Saturday, May 11, when the Corona made the first trip to Lewiston.

Windsor.—After reposing on the bottom of Lake Erie for nearly one hundred years, Admiral Perry's old flagship Niagara is to be raised. This has been decided on by the committee having in charge the centennial celebration, which it is proposed to hold at Put-In-Bay, on Lake Erie, during August this year. The Niagara lies somewhere in the vicinity of Erie, Pennsylvania, and her recovery will lead to some interesting comparisons between the fighting ships of that time and of the present day.

Kingston.—The Government tug Bellechasse was not launched on Saturday, May 11, as expected, owing to it being impossible to have her ready. Gangs have been working night and day on her for some time. It is expected that she will be slipped into the dock, however, on Wednesday, May 13.

Montreal and Quebec

St. Lawrence River. — The Federal Government has secured by contract for another year the George Davie wrecking outfit for use on the St. Lawrence River. It is also reported that in addition to this, the shipping interests are taking steps to provide a thoroughly up-to-date plant, installed with wireless telegraphy and other modern equipment.

HEROISM OF TITANIC'S CREW.

The officers and men of the Titanic, from Captain Smith downwards, did their duty like true British sailors. If a special word of praise can be given to any of them, it should be given to the engineers, who remained at their posts to the very last and perished to a man. Survivors report that the electric light remained burning almost till the ship took her final plunge, and the Virginian commander states that the wireless signals from the Titanic ceased at 1.57 a.m., only twenty minutes before the end. When at last the engineers were driven from the engines by the rising water their own fate was sealed. They had, however, helped to keep the Titanic afloat for some precious minutes, and rendered possible the escape of a number of people who would otherwise have perished.

Quebec Dry Dock.—Sealed proposals will be received at the Public Works Department up to the 2nd day of July, 1912, for the construction of a dry dock at the Port of Quebec. Dimensions of dry dock to be not less than 1,150 feet useable length, 110 feet clear width at entrance, and at least 37 feet in depth over sill and keel blocks at ordinary high water spring tide, and to be in three compartments. Dry dock will be located either at Lauson or in the estuary of the River St. Charles, or on the Beauport flats, and applicants will be required to submit with their proposal a report signed by their engineer or engineers setting forth in detail: (1) the respective advantages from the viewpoint of the shipping interests of each of the above-mentioned sites; (2) plans and specifications with full and detailed estimates of cost. R. C. Desrochers, Secretary, Department of Public Works, Ottawa.

Montreal.—The first ocean liner to reach here this year docked on May 1, the Zeiten arriving at 5 p.m. Passengers had been landed at Quebec with part of the cargo. The trip up the river from Quebec was accomplished without difficulty, and little ice was experienced. The opening of navigation is later than usual. Last year the Royal George was the first boat up, docking on April 29. Captain Frank of the Zeiten will be presented with a gold-headed walking cane, suitably inscribed, by the Harbor Commissioners, according to custom.

Montreal.—The Dominion Steel Corporation will have seven new boats in commission this summer. Two of the boats are passenger and freight, and five are colliers. The total tonnage of the fleet this year represents the large figure of 113,500 tons, and a very large increase in the business of the corporation is anticipated by General Traffic Manager McIsaac.

Pilotage By-Laws.—An order-in-council has been issued amending article 4 of the by-laws of the pilotage district of Quebec, providing that apprentice pilots after completing their seven years of apprenticeship, with the necessary ocean going voyages, shall hold a coasting mate's certificate, instead of a certificate of first mate seagoing competency.

Montreal. — The Merchants Mutual Line reports the arrival on May 9 of the lake steamer Alma with 88,000 bushels of grain. The following other vessels arrived on May 10:—Plummer, 60,000 bushels; Pellatt, 55,000; Beaverton, 72,000; Saskatoon, 80,000; Benvoyle, 80,000. On May 11 the Gordon, the Canadian and the Arcadian arrived with 210,000 bushels in all. Officials of the line claim that this is by far the largest consignment of grain ever brought to the port by one line in three days.

Maritime Provinces

Halifax.—The Cunard Liner Ultonia, which recently arrived here under her own steam, but with the port engine disabled through the loss of a propeller, was on her first voyage to Quebec and Montreal. Examination by divers revealed the fact that not only was the

propeller gone, but with it, a part of the tail shaft, extending just inside the stern tube. No explanation has so far been given of the mishap.

Sydney.—The Dominion Steel Corporation have added seven new steamers to their Black Diamond Line this season, including two new passenger and freight vessels, and five colliers. The passenger boats will be the "Marwenna," 1,414 tons, and the City of Sydney, 2,500 tons. Among the new colliers are the Glace Bay and Bridgeport, both 11,000-ton steamers. These are now building and will arrive on this side in about six weeks. The other new colliers are the Hochelaga, 7,500; Kamouraska, 7,500; Miskinonje, 7,500; Wabana, 7,500. The Marwenna is 260 feet in length, 34 foot beam, draught loaded 17 feet, and has a speed of 13 knots. She has accommodation for 60 saloon and 28 second class passengers, is equipped with Marconi wireless, electric light, is electric heated throughout, and generally adapted for the passenger and freight service. The City of Sydney is 295 feet long, 40 foot beam, depth of hold 21 feet, and has a speed of 13 knots. She has accommmodation for 115 saloon and 14 steerage passengers, and is also fully equipped with all the most modern comforts.

St. John.—The pilot boat Nina Blanch was recently abandoned in the Bay of Fundy, ten miles from the city, having sprung a leak. Only two of the crew were aboard, and they reached shore after a hard row. The vessel was later washed ashore on the rocks.

Halifax.—The Norwegian barque Urbye, from Genoa, for Bridgewater, with ballast, to load for River Plate, ran ashore at Port Beckerton recently in a thick fog, and became a total loss. The captain and crew escaped in the ship's boat, but they had to leave so fast that they were unable to take anything with them, hardly having enough clothing to cover themselves.

Great Britain and Ireland

Liverpool. H. & C. Grayson have completed the extensive repairs to the Mauretania, and still have in hand the Canadian Pacific Railway Co.'s liner Lake Champlain.

Belfast.—The 12,000-ton Allan liner Scandinavian, formerly the Dominion-White Star Romanic, has had her passenger accommodation greatly altered by Workman, Clark & Co., and left on the 18th March to take up her sailings under the new flag.

Dundee.—The sealing and icebreaking steamer Sagona recently completed for Newfoundland owners by the Dundee Shipbuilding Co., attained a speed of 12 knots per hour on her trial trip. The vessel's dimensions are as follows: 175 by 28 by 13½ feet, and 700 gross tonnage. The engines are triple expansion and accommodation is provided for a limited number of passengers.

S. S. Letitia.—The new Donaldson liner Letitia sailed from Glasgow on Saturday, May 4, on her maiden voyage to Montreal. Her passenger list numbered 800.

Portsmouth. — The seamen of the White Star liner Olympic, who quit that vessel after the strike of the firemen, were discharged by the magistrates sitting in the police court here. The men were up for mutiny. The magistrates decided the the charges were proved, but expressed the opinion that it would be inexpedient to imprison or fine the defendants in view of the circumstances, which had arisen prior to their refusal to obey orders. The hope was expressed that the men would return to duty.

Some Cheque.—On April 17 was paid the largest cheque ever drawn on the Bank of England by a private company. It was for $25,867,000 in favor of Donald Currie & Co., and signed by Sir Owen Phillips on behalf of the Royal Mail Steam Packet Co. The cheque paid for the share capital and good will of the Union Castle Steamship Co.

Comet Celebration.—We understand that the British Admiralty has entered most heartily into the arrangements to make the Comet celebrations worthy of the occasion and of the River Clyde. The details will not be disclosed for some time yet, but a first-class naval display is assured. There is only one cause for regret; it having been hoped to obtain a loan of the original Comet engines. These are deposited in a London museum, to which they were presented as a gift in 1862 by Messrs. Robert Napier and Sons, and it would seem that the relics cannot be removed.

Naval Conference.—The Right Hon. Lewis Harcourt has informed Norton Griffiths that unless Canada wants a Conference representing all the Dominions on the navy question, he thinks it unnecessary to ask the others to send representatives.

London.—That he would not be surprised to see a shipbuilding undertaking established at St. John, N. B., is the statement of Norton Griffiths, M.P., though he does not think Canada can build her own ships for the next few years. Mr. Griffiths would like to see the development of a Canadian naval college scheme, and the establishment of a great profession in the Dominion for her young men to aspire to. The idea of a great constructive policy, he said, seems to have taken root in the Dominion, but the British Government will be wasting time if it invites the Dominion to help without granting it representation. The present Canadian Government is most favorable to giving whole-hearted support to the mother country in naval affairs. The scheme, however, would have to be one befitting Canada, and of which Canadians will be proud; in fact a large constructive policy.

S. S. Erna.—All hope has now been abandoned of the safety of the steamer Erna, which left the Clyde on February 28 last for St. John's, N. F., and has not been heard of since, although she was due at her destination in 10 days. The generally accepted theory concerning her loss is that she encountered ice floes in the vicinity of the Banks of Newfoundland, in which, it is feared, she has been crushed to pieces, foundering with the whole of her crew, of over 40 men.

United States

Boston.—A new Canadian concern, probably to be named the Boston-Yarmouth Steamship Company, will be formed shortly to operate three steamers which the Eastern Steamship Co. recently arranged to take over from the Dominion Atlantic line. The stock of the new company will be held by the Eastern Corporation, which will be in a better position to extend Nova Scotia business than the Canadian Pacific, which controls the Dominion Atlantic Railway. The railway is not included in the transfer and the Canadian Pacific and Eastern S. S. Company will work in harmony. In time, fewer and better boats will be put in the service.

Panama Canal.—The ladder dredge Corozal, which arrived at Balboa from Scotland on March 27, began work in the Pacific entrance on April 15.

Cleveland.—Five men were burned to death and damage estimated at $450,000 done to boats and gasoline on the docks when Standard Oil barge No. 88 exploded on May 1. The barge, which was at the Jefferson Avenue docks on the Cuyahoga River, was being filled with gasoline from a ten-thousand-gallon tank on the bank. Leaking oil on the surface of the river was ignited and set fire to the barge. A terrific explosion immediately followed. The men killed were caulking another barge alongside, and were enveloped in the flames, which spread over the surface of the river. No one was on the barge when the oil exploded. The burning oil set fire to four other boats, and the tug Wisconsin was destroyed. The tugs Annie A. Martin and Pennsylvania, at a dock opposite the burning barge, were badly damaged. All belonged to the Great Lakes Towing

Company. Another barge belonging to the Standard Oil Company was also destroyed. The Grasselli Chemical Company dock at the Great Lakes drydock, and the Sandard Oil Company's dock were badly damaged.

Chicago.—The port of Collingwood is to be added to the ports of call for vessels of the Goodrich Line of passenger steamers this season. The boats, after passing the Soo, will touch at Collingwood once a week. It is expected that the new service will be liberally patronized by American summer tourists.

Washington.—Regulations regarding life-saving appliances on American-owned ships will be extended to foreign-owned vessels as well by a bill agreed to on May 1, by the House Merchant Marine Committee. It also requires passenger ships on the great lakes to be equipped with wireless, but would exempt Long Island Sound passenger ships from the ocean-going requirements. Auxiliary wireless equipment and two operators for each ship are among other features of the measure.

Detroit.—Vessel managers are protesting against the order issued this week by the Canadian Government instructing grain inspectors at Fort William and Port Arthur that all grain must hereafter be loaded in the day time. The enforcement of the order means that vessels taking grain cargoes at Canadian ports will be held several hours longer than under the former system, which permitted shippers to load vessels at night, conditional upon their assuming responsibility for grain passing inspection. The Lake Carriers' Association, through President Livingstone, has appealed to the Dominion Government for the rescinding of the order.

Detroit.—One hundred and fifty warehousemen, employed by the Detroit and Cleveland Navigation Co., quit work recently, when refused an increase from 18 to 20 cents an hour. The Cleveland and Buffalo boats were held up in loading and unloading.

General

Cunard-Thomson Line.—The two vessels which the Cunard Co. recently ordered in Great Britain for its Canadian service, to be operated as the Cunard-Thomson Line, with Robert Reford Co. as agents, will be named Andania and Alaunia. They are being built by Scott's Shipbuilding and Engineering Co., Greenock, Scotland, and will each be about 540 feet long, 63¼ feet beam, 46 feet deep to shelter deck, and of about 13,000 gross. Accommodation of a superior character will be provided for 500 second class and over 1,500 third class passengers; the latter being all in two and four berth rooms. The equipment will include all the most modern improvements. The machinery will consist of two sets of balanced quadruple expansion engines, having cylinders 26, 37, 53 and 76 in., dia. respectively, with a stroke of 54 in. Steam will be supplied by five double ended boilers.

Casualties.—Despite the fact that navigation has not long opened, a number of casualties have already been reported. The steamer J. H. Hough grounded in the Strait of Mackinaw, but released herself and proceeded to the Soo. The Turret Court grounded at Fort William. The Empress of Midland grounded near Tobermory. The steamer America grounded on Harson's Island, but managed to get afloat soon after.

Empress of China.—It is reported from Japan that the C.P.R. steamship Empress of China, which was wrecked off Shirahama, Japan, July 26, 1911, and which was floated early this year, has been declared by the underwriters to be a total constructive loss, and that she will be offered for sale by public auction.

"Toiler" changes hands.—James Playfair, Midland, has purchased the oil engine propelled frieghter Toiler, for service between Montreal and Lake Erie ports.

SAILING VESSELS REGISTERED IN CANADA, JANUARY, FEBRUARY, MARCH, 1912.

Official No.	Name of Ship	Port of Registry.	Rig.	When and where built	Length	Breadth	Depth	Regd. Tonnage	Owner or Managing Owner.
130,739	A. M. Westhaver..	Lunenburg.....	Schr...	1911 Mahone Bay, N.S. ...	114.3	26.0	10.2	100	D. Westhaver, M.O., Lunenburg, N.S.
130,740	Al. A. Young.....	Lunenburg.....	Schr...	1911 Mahone Bay, N.S. ...	94.8	25.0	10.3	92	J. Hiltz, M.O., Indian Point, N.S.
130,489	B. Jax.....	N. Westminster.....	Barge..	1911 N. Westminster, B.C.	95.0	32.0	9.0	249	Mrs. Alice M. Garnett, Victoria, B.C.
130,426	Barracouta.....	St. Andrews, N.B....	Sloop..	.... Unknown	32.2	10.5	4.3	9	Wm. Hope, Montreal, Que.
130,836	D. 3.....	Port Arthur.....	Scow...	1911 Fort William, Ont..	80.0	28.0	5.0	104	Great Lakes Dredg. Co., Port Arthur.
130,837	D. 4.....	Port Arthur.....	Scow...	1910 Fort William, Ont...	75.0	28.0	5.5	98	Great Lakes Dredg. Co., Port Arthur.
126,675	D. 25.....	Port Arthur.....	Scow...	1909 Fort William, Ont...	94.0	24.0	7.8	149	Great Lakes Dredg. Co., Port Arthur.
126,676	D. 26.....	Port Arthur.....	Scow...	1909 Fort William, Ont. .	95.6	24.0	7.6	149	Great Lakes Dredg. Co., Port Arthur.
126,677	D. 34.....	Port Arthur.....	Scow...	1909 Fort William, Ont. .	121.5	29.0	9.2	272	Great Lakes Dredg. Co., Port Arthur.
126,678	D. 35.....	Port Arthur.....	Scow...	1909 Port Arthur, Ont. ...	122.4	28.8	9.4	278	Great Lakes Dredg. Co., Port Arthur.
126,679	D. 38.....	Port Arthur.....	Scow...	1910 Port Arthur, Ont. ...	149.0	36.0	15.5	675	Great Lakes Dredg. Co., Port Arthur.
126,680	D. 39	Port Arthur.....	Scow...	1910 Port Arthur, Ont. ...	149.0	36.0	15.5	675	Great Lakes Dredg. Co., Port Arthur.
130,831	D. 40.....	Port Arthur.....	Scow...	1909 Port Arthur, Ont. ...	151.0	36.0	10.8	502	Great Lakes Dredg. Co., Port Arthur.
130,832	D. 41.....	Port Arthur.....	Scow...	1909 Port Arthur, Ont. ...	135.5	36.0	10.8	445	Great Lakes Dredg. Co., Port Arthur.
130,833	D. 42.....	Port Arthur.....	Scow...	1909 Port Arthur, Ont. ...	135.5	36.0	10.8	444	Great Lakes Dredg. Co., Port Arthur.
130,834	D. 43.....	Port Arthur.....	Scow...	1910 Fort William, Ont. .	149.0	36.0	15.5	675	Great Lakes Dredg. Co., Port Arthur.
130,835	D. 48.....	Port Arthur.....	Scow...	1910 Fort William, Ont. .	149.0	36.0	15.5	675	Great Lakes Dredg. Co., Port Arthur.
130,503	Don. G. Hollett..	Shelburne.....	Schr...	1911 Shelburne, N.S.	111.0	25.2	10.9	99	Thos. V. Hollett, Burin, Nfld.
130,585	Edith Adele.....	Halifax.....	Schr...	1912 Tancook, N.S.	52.6	14.6	7.6	33	J. C. Martin, M.O., Ketch Harbor, N.S
130,738	Fran. Lenore....	Lunenburg.....	Schr...	1911 Tancook, N.S.	41.6	10.0	5.6	12	R. Garrison, M.O., Indian Harbor, N.S
130,490	G. Jax.....	N. Westminster.....	Barge..	1911 N. Westminster, B.C.	95.0	32.0	9.0	249	Mrs. Alice M. Garnett, Victoria, B.C.
85,342	Leo	Lunenburg.....	Bgtn...	1882 Mahone Bay, N.S. ...	97.2	24.6	10.8	165	J. L. Publicover, M.O., Dublin, N.S.
130,811	Lil. M. Richard..	Lunenburg.....	Schr...	1911 Liverpool, N.S.	108.7	25.6	10.3	98	E. Richard, Jr., M.O. Lunenburg, N.S.
130,736	Matapedia.....	Lunenburg.....	Schr...	1911 Shelburne, N.S.	103.0	26.4	10.6	98	J. Backman, M.O., Riverport, N.S.
130,492	P. D. C. 5.....	N. Westminster.....	Dredge	1911 N. Westminster, B.C.	71.3	19.7	6.0	149	J. W. Pike, N. Westminster, B.C.
*130,610	Wabash No. 1..	Victoria.....	Barge..	.... U.S.A.	50.0	15.0	3.5	20	F. A. & Frk. MacFarlane, Sydney, B.C
130,818	Araucania.....	Lunenburg.....	Schr...	1911 Mahone Bay, N.S. ..	103.0	25.5	10.5	92	M. Rodenheizer, M.O., Lunenburg.
130,843	C. B. No. 1.....	Vancouver.....	Scow...	1911 Vancouver, B.C.	80.2	35.0	6.0	223	Columbia Bitulithic, Vancouver.
130,504	E. M. Rudolph..	Shelburne.....	Schr...	1912 Allendale, N.S.	66.2	18.9	8.2	54	W. MacMillan, et al., Lockport, N.S.
130,819	Elsie Porter....	Lunenburg.....	Schr...	1911 LaHave, N.S.	109.2	26.0	10.8	100	N. Reinhardt, M.O., LaHave, N.S.
94,855	Evolution.....	Liverpool.....	Schr...	1889 Spencer's Island	107.0	28.3	10.5	173	Queens Co. R. Co., Wilkins Siding, N.S
**126,857	Frieda.....	Sorel.....	Barge.(	1887 Fort Edward, N.Y..(1911 Sorel, Que. .....(	87.0	17.2	6.2	98	D. Chevrier, St. Joseph de Sorel, Q.
130,812	Gladys & Lillian..	Lunenburg.....	Schr...	1911 Allendale, N.S.	88.5	24.8	9.5	84	H. Adams, M.O., Lunenburg, N.S.
130,664	Lapewalem.....	Richibucto.....	Schr...	1911 Rexton, N.B.	32.0	12.4	5.0	10	J. Doucet, Rexton, N.B.
130,815	Lil. B. Corkum...	Lunenburg.....	Schr...	1912 Liverpool, N.S.	108.7	25.6	10.3	97	W. Corkum, M.O., Lunenburg, N.S.
130,820	Lot. A. Silver....	Lunenburg.....	Schr...	1912 Liverpool, N.S.	108.6	26.0	10.2	99	R. Silver, M.O., Lunenburg, N.S.
130,814	Luc. B. Creaser..	Lunenburg.....	Schr...	1912 Lunenburg, N.S.	106.8	26.3	10.4	99	A. Creaser, M.O., Riverport, N.S.
130,848	McBride & Co. 2..	Vancouver.....	Scow...	1911 N. Vancouver, B.C...	73.4	28.0	6.6	123	T. G. McBride, M.O., Vancouver.
130,816	Marion Adams....	Lunenburg.....	Schr...	1912 Lunenburg, N.S.	106.8	26.3	10.4	99	H. Adams, M.O., Lunenburg, N.S.
130,655	Mary E. Rive....	Chatham, N.B.....	Schr...	1911 Caraquet, N.B.	41.5	14.2	6.4	21	Harry Rive, Caraquet, N.B.
130,821	Mianus.....	Lunenburg.....	Schr...	1912 Tancook, N.S.	45.2	10.8	6.0	15	L. Hubley, Indian Harbor, N.S.
130,613	Nidge No. 1....	Victoria.....	Barge..	1912 Victoria, B.C.	60.0	20.0	4.7	46	Vancouver Is. Power Co., Victoria.
130,656	P. A. L.....	Chatham, N.B.....	Schr...	1911 Caraquet, N.B.	38.0	14.0	6.0	17	Pierre Aime Lanteigne, Caraquet, N.B
130,491	P. D. C. 2.....	N. Westminster.....	Dredge	1909 N. Westminster, B.C.	67.0	23.5	5.3	157	J. W. Pike, N. Westminster, B.C.
130,838	Province.....	Port Arthur.....	Scow...	1911 Fort William, Ont..	162.0	40.0	10.0	580	Can. Tow. & Wreck. Co., Port Arthur
130,817	R. L. Borden....	Lunenburg.....	Schr...	1912 Liverpool, N.S.	115.4	26.1	10.3	99	A. Himmelman, M.O., Rose Bay, N.S.
130,505	Theresa Maud...	Shelburne.....	Schr...	1912 Allendale, N.S.	91.5	25.2	9.3	78	W. Forsey, Grand Bank, Nfld.

**Foreign name "J. L. Mock." *Foreign name "Stella."

PANAMA CANAL LOCK TOWING SYSTEM.

WORK is advancing upon the locomotive tracks at both the Gatun and Pedro Miguel Locks. The tracks are to carry the electric locomotives which control the movement of vessels through the locks. It is necessary that each lock chamber be equipped with a towing track and return upon either side. This requires seven complete tracks at each of the locks—a towing and a return track upon each side wall, and a pair of towing tracks and a common return track upon the centre wall. All tracks extend the entire length of the lock walls and are provided with crossovers at both ends. The lines of the towing locomotives are fastened to the vessel in either the upper or lower forebay, and the locomotive then begins its travel; continuing at the rate of two miles an hour the entire length of the towing tracks. At the end of the run, the locomotive is transferred on the crossovers to the return track, upon which the return trip is made at the rate of five miles an hour.

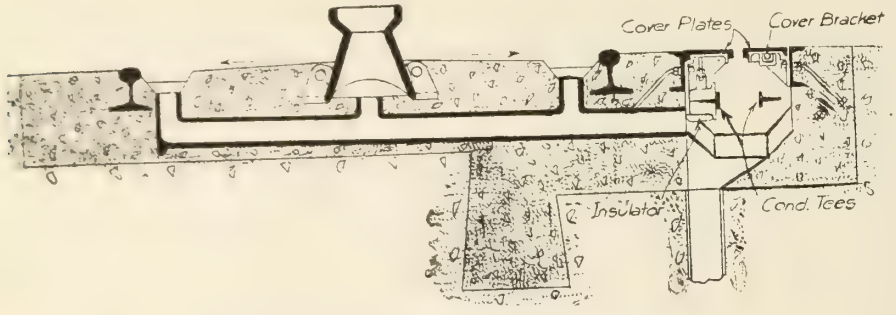


Fig. 2—Panama Canal—Large Scale Section of Towing Track, Showing Details of Rack, Conductor Slot and Drains.

In comparison with ordinary first-class railway construction, the locomotive trackage of the locks is unique. In point of durability, the system has no superior. The foundation is of concrete; the ties are of steel; the rails are heavy-weight—90 pounds to the yard; and, in addition, there is a rack for the towing track, a conductor slot housing a pair of electric rails for both the towing and the return track, and a complete drainage of surface, rack, rail gutters, and slot.

The installation is adapted to the ever varying features of the masonry construction. The towing track, which is subjected to the heavier duty, is in general supported upon the massive concrete adjacent to the edge of the lock chamber, a continuous, wide groove, 12 inches deep, having been left in the initial masonry as space for the erection of the track. The towing track is provided with heavy anchor bolts at each tie, spaced on three-foot centres and imbedded two and one-half feet in the concrete. Such anchoring is essential in order to provide against an up-pull of the thrust wheels on the locomotive acting against the rack, the thrust being possible in case of extraordinary side-pull of the towing lines, tending to overturn the locomotive. The return track is of somewhat lighter construction and, in general, is supported directly above the operating tunnels of the lock walls. The typical tie spacing upon the return track is 3 feet 9 inches, instead of three feet, as for the other. The tracks contain vertical curves between lock levels and horizontal curves at offsets; the former constructed on a 100-foot radius, and the latter on a 200-foot radius. Other special constructions are found at the cantilever decking over the indented recesses for miter gates, at the different crossovers, at the emergency dam inclines, at chain fender rooms, at intake and discharge valve rooms, and at a few manholes and cable shafts.

The accompanying illustration, Fig. 1, shows a typical cross-section of the towing and return track as installed. The towing track is situated 6 feet 9 inches to centre line from the edge of the lock chamber and rests upon the solid masonry of the gravity section of the lock wall. In this masonry, a channel twelve inches deep and a dove-tailed groove are left until the track and anchors have been set, when the concrete is carried up to final elevation, and the track and anchors thoroughly imbedded. The track material is furnished under contract; the ties, rack, and rails being drilled ready for connecting. In the field, the ties are spaced out, the rails spliced and bolted to the ties, as well as one side channel of the conductor slot. The rack is also bolted in position. The entire track is aligned and leveled, and the concrete cast, graded, and finished for proper drainage.

The surface of the concrete is sloped from the rack at the centre of tracks to rail gutters on either side, which gutters are sloped longitudinally to frequent outlets. At every outlet, a special cast-iron drain pipe, two inches in diameter, carries the water from each rail gutter and from underneath the rack to a sump situated at the bottom of the conductor slot on one side of the track. A four-inch drain pipe connects the conductor slot sump to a large drainage tunnel located underneath the duct space of the operating tunnel, fourteen feet below the coping. Other drains have a discharge at the conductor slot sump. This construction is varied to suit different requirements of centre wall return track, as well as other conditions. The finished appearance of the track is very trim, a relatively small portion of the rail being exposed to view and to the action of the elements in a tropical climate.

A rack, Fig. 2, for supplying the requisite traction is placed upon the centre-line of each towing track, as ordinary friction between wheels and rail is not sufficient for the maximum towing pull. The rack is of cast steel and of peculiar section, designed for the double purpose of engaging the driving cog of the locomotive and also a pair of horizontal thrust wheels; the function of which is to prevent overtipping of the locomotive in event of an excessive side-pull of the tow line. The pitch of the rack teeth is 3.13 inches, and each rack section is cast in lengths of six feet; being double tie-spacing. The sections are bolted together longitudinally and also bolted to each tie.

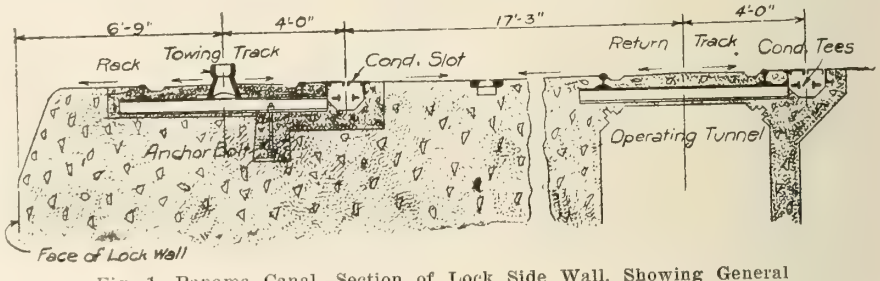


Fig. 1—Panama Canal—Section of Lock Side Wall, Showing General Features of Towing and Return Tracks.

The ties are rolled steel of modified I section, 5½ inches high with a top base of 8 inches and a lower base of 4½ inches. In railway work, it is common practice to install the larger base of the tie on the lower side to obtain a better bearing value. With a rail embedded in the concrete, the bearing value is of smaller importance, and the ties for the towing track are installed

with the larger base up in order to furnish more space for bolting the rack to the ties. A conductor slot is provided on the off-tow side of each track as a means of supplying electrical energy to the locomotive, which operates on a 3-phase circuit at twenty-five cycles and 220 volts. Two of the phases are carried through the conductor slot, whereas the third phase is connected to the two running rails and grounded. The two conductors in the conductor slot are of T-section and supported by clamp insulators from malleable iron brackets. For the towing tracks, the T-conductors are manufactured from copper ingots by the extrusion process, as considerable current-carrying capacity is necessary. For the return track, rolled steel T's are used as conductors. The conductor slot proper is 14 inches wide by 11 to 14 inches deep; the depth varying in order to slope toward the drainage sumps. The upper corners of the conductor slot are protected by five-inch channels imbedded and anchored into the concrete. Rolled steel checkered plates, in sections 30 feet long, cover the slot, resting upon frequently spaced brackets. A pair of contact plows, which bear against the flat side of each conductor rail and are attached to the locomotive, transmit the current from the conductors to the locomotive motors.

SAILING VESSELS REMOVED FROM THE REGISTER, JANUARY, FEBRUARY, MARCH, 1912.

Official No.	Name of ship.	Port of registry.	Net tonnage	Cause assigned.	Date of loss
126,017	A. F. Davidson...	Annapolis Royal..	503	Transferred to Bridgetown, Barbados	
96,945	Abana.....	St. John, N.B.....	97	Condemned	
75,633	Albatross.....	St. Catharines.....	317	Lost in	1911
126,667	Alice M. Pike...	Shelburne.....	86	Transferred to St. John's, Nfld.	
71,261	Annie Cuthbert..	Cobourg.....	36	Out of existence	
.....	Azov.....	Hamilton.....	195	Sank	Oct. 22, 1911
112,020	Bonny Kate.....	Canso.....	14	Sold to foreigners (French subjects) ...	
75,647	Defiance.....	St. Catharines.....	89	Out of existence	
71,267	E. R. C. Proctor..	Cobourg.....	163	Out of existence	
116,512	Effie May.....	Lunenburg.....	49	Stranded	Nov. 16, 1911
107,123	Emulator.....	Lunenburg.....	99	Stranded	Nov. 30, 1911
94,855	Evolution.....	Parrsboro.....	173	Sold to foreigners (U. S.A. citizens)	
116,284	Janet R.....	Halifax.....	37	Transferred to St. John's, Nfld.	
117,034	Kate.....	S. S. Marie.....	30	Burnt	Apr. 25, 1910
112,096	Laura C.....	Lunenburg.....	249	Transferred to Bridgetown, Barbados	
101,246	L. E. Franklin..	Halifax.....	46	Wrecked	
78,030	Messenger.....	Collingwood.....	94	Broken up	
103,416	Min. J. Smith....	Lunenburg.....	99	Transferred to St. John's, Nfld.	
80,775	Mittie.....	Sarnia.....	18	Wrecked	15 years ago
85,562	Oresa.....	Halifax.....	14	Lost	Nov. 1, 1911
100,231	Pearl.....	Halifax.....	17	Broken up	
126,665	Stanley & Frank.	Shelburne.....	74	Transferred to St. John's, Nfld.	
112,097	Virginia.....	Lunenburg.....	134	Stranded	Jan. 9, 1912
83,258	Alfred.....	Weymouth.....	29	Broken up	
126,117	Arginia.....	Lunenburg.....	99	Transferred to St. John's, Nfld.	
75,643	Ayr.....	St. Catharines.....	299	Out of existence	
74,320	Brenton.....	Yarmouth.....	69	Broken up	
116,531	Flor. B. W.....	Halifax.....	24	Transferred to St. John's, Nfld.	
100,098	Kittie J.....	St. John, N.B.....	1	Broken up	
124,915	Nina L.....	Sydney, N.S.....	96	Lost at sea	Dec. 12, 1911
103,209	Rhoda.....	Liverpool.....	199	Lost at sea	Dec. 29, 1911
126,597	W. S. M. Bentley.	Parrsboro.....	364	Transferred to Port of Nassau N.P., Bahamas	
	32 Vessels.....	.....	3,813		

Collingwood, Ont.—The Niagara, St. Catharines & Toronto Navigation Company have kept their promise made at the close of navigation last year that they would build another steamer this year to meet the requirements of their patrons between Toronto and Port Dalhousie. An order has been placed with the Collingwood Shipbuilding Co. for a new steamer to cost $160,000. The length will be 200 feet, with a depth of 38 feet six inches. The new vessel will accommodate 1,268 passengers.

STEAM VESSELS REGISTERED IN CANADA, JANUARY, FEBRUARY, MARCH, 1912.

Official No.	Name of Ship	Port of Registry	When and where built	Length	Breadth	Depth	Gross tonnage	Regd. tonnage	Engine H.P.	Owner or Managing Owner.
130,737	Asaph F.	Lunenburg	1911 Little Tancook, N.S...	43.6	10.8	6.6	15	14	1	Albert Fleet, Blandford, N.S.
130,805	Chelohsin	Vancouver	1911 Dublin	175.5	35.1	14.0	1134	597	131	J. H. Welsford, Liverpool, England.
130,808	Enola	Vancouver	1902 Ballard, Wash., U.S.A.	43.4	13.2	6.2	26	18	8	T. Duke & J. McArthur, Vancouver.
130,804	Epauline	Vancouver	1911 Vancouver, B.C.	68.0	17.0	8.0	57	44	3½	Samuel L. Howe, Vancouver.
122,295	George V.	Prince Albert ..	1911 Prince Albert, Sask. ..	110.0	26.7	4.0	105	66	4 1-3	City of Prince Albert, Sask.
*130,806	Gilford	Vancouver	1907 Seattle, Wash., U.S.A.	39.1	12.4	4.6	18	12	2	Gilford Fish Co., Vancouver.
130,800	Glenboro	Vancouver	1912 Vancouver, B.C.	64.0	17.3	8.6	74	50	13	Wm. McRae & R. Johnson, Vancouver.
130,406	H.C.M. No. 1...	Montreal	1868 Montreal, Que.	84.0	24.0	8.2	135	72	7½	Harbor Commissioners of Montreal.
130,612	Iance	Victoria	1911 Simpson, B.C.	38.7	9.2	3.7	13	9	1	Charles A. Gardner, Victoria, B.C.
†130,801	Kitwinmar.....	Vancouver	1912 Seattle, Wash., U.S.A.	43.4	12.2	4.6	15	10	1	Ellsworth McMillen, N. Vancouver.
130,802	Lady Lake.....	Vancouver	1896 Ballard, Wash., U.S.A.	58.2	15.0	6.7	56	38	16	Charles E. Strong, Vancouver.
130,803	M.T. Co. No. 2 .	Vancouver	1907 Decator, Wash., U.S.A.	57.7	11.5	4.9	33	22	7	Metropole Trans. Co., Vancouver.
130,611	Olive M.....	Victoria	1911 Victoria, B.C.	78.0	22.0	10.0	134	63	30	Vancouver Island Tow. Co., Vancouver
130,807	Orlomah.....	Vancouver	1910 Vancouver, B.C.	40.0	10.1	5.0	17	12	2	John J. Banfield, Vancouver.
115,685	Prin. Patricia. .	Victoria	1902 Dumbarton, G.B.	270.0	32.1	11.0	665	52	450	Can. Pac. Ry. Co., Montreal.
‡130,642	Restigouche.....	Ottawa	1900 Kinderdyk, Holland .	156.0	33.0	10.2	470	319	60	Minister of Public Works, Ottawa.
§116,305	Sedar Isle.....	Charlottetown (	1905 Charlottetown, P.E.I.) ... 1911 Falconwood, P.E.I...)	25.3	7.8	3.0	3	2	1	V. L. Goodwill, Charlottetown, P.E.I.
130,798	We Lead.....	Vancouver	1910 Vancouver ,B.C.	32.0	8.5	3.2	9	6	3	Albert B. Bettes, Vancouver.
130,799	Wyrill.....	Vancouver	1911 Vancouver, B.C.	48.8	11.0	4.8	23	16	3	William A. Bauer, Vancouver.
85,409	A. C. Newhall..	Magdalen Is. ...	1858 Salisbury, Mass. U.S.A	63.6	18.3	6.3	32	30	4 1-5	Eastern Canada Fisheries, Montreal.
130,842	Aquilo.....	Vancouver	1901 S. Boston, Mass. U.S..	127.4	20.0	11.3	176	104	37¾	B. T. Rogers, Vancouver.
130,849	Centre Star.....	Vancouver	1912 Vancouver, B.C.	50.5	13.4	6.4	39	27	8	Wm. S. Nicholls, Vancouver.
130,493	Cheerful.....	N. Westminster.	1912 Fraser Mills, B.C.....	73.4	18.0	7.8	80	42	28 1-6	Canadian Tug Boat Co., Vancouver.
130,852	Cohoe.....	Vancouver	1911 Seattle, Wash., U.S.A.	44.6	12.6	4.9	19	13	2½	Wallace Fisheries, Vancouver.
130,844	Don 2.....	Vancouver	1911 Lund, B.C.	33.8	8.6	3.7	10	7	1½	W. R. Armson, Lund, Vancouver.
130,615	Dragon Fly....	Victoria	1911 Bay City, Mich., U.S..	39.4	10.6	5.0	15	9	2½	Louis O. Garnett, Cobble Hill, B.C.
130,845	Emoh.....	Vancouver	1812 Vancouver, B.C.	44.0	11.0	4.8	17	12	2½	Richard Wm. Holland, Vancouver.
130,494	Fearful.....	N. Westminster.	1912 Fraser Mills, B.C.....	73.4	18.0	7.8	80	42	28 1-6	Canadian Tug Boat Co., Vancouver.
130,853	Fl. of Buchan..	Vancouver	1912 Steveston, B.C.	37.0	9.2	3.1	8	5	1	James Winter et al., Vancouver.
130,846	Fran. Idaho....	Vancouver	1911 Vancouver, B.C.	37.5	11.0	5.0	14	10	7½	A. Gill, Vancouver. L. Godtel, West Sooke, B.C.
130,847	Full Moon	Vancouver	1912 Vancouver, B.C.	48.0	10.5	5.3	24	16	2½	Knox Walkem, Vancouver.
130,614	Letitia-Sophia. .	Victoria	1910 Victoria, B.C.	30.4	8.2	3.4	6	4	1	A. H. Aldridge, S. Pender Island, B.C.
130,810	Multke.....	Vancouver	1911 Steveston, B.C.	38.0	9.0	3.7	9	7	1	David Jureit, Steveston, B.C.
130,850	P. Mann No. 1...	Vancouver	1911 Vancouver, B.C.	40.0	9.0	4.6	13	9	2	Arthur H. Bowell, Vancouver.
130,841	Tamerlane.....	Vancouver	1910 N. Vancouver, B.C....	21.6	9.0	3.4	4	3	1½	Wm. G. Breeze, Vancouver.
126,856	Traversier No. 1	Sorel	1911 Sorel, Que.	50.3	26.1	3.3	37	31	1	Joseph Salvail, Sorel, Que.
129,475	Venture	Victoria	1910 Old Kilpatrick, G.B..	180.4	32.1	17.0	1011	580	171	The Boscowitz Steam. Co., Victoria.
**130,851	W. No. 1.....	Vancouver	1911 Seattle, Wash., U.S.A.	50.0	13.3	4.8	27	19	2½	Wallace Fisheries, Vancouver.
130,813	Z. T. Young....	Lunenburg	1912 Little Tancook, N.S..	43.6	10.8	6.9	16	15	3-5	V. Zinck, M.O., Blandford, N.S.

*Foreign name "Magellan." †Foreign name "Foam." ‡Foreign name "Nereus." §Formerly "R. Tis. 3." **Foreign name "Boston."

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals who Have Been More or Less Prominent in the Marine Sphere

A. McDougall, Maitland, N. S., has been appointed inspector of hulls for Nova Scotia.

* * *

I. E. Lowe, Ladysmith, has been appointed a commissioner for the pilotage district of Nanaimo, vice W. C. Fraser.

N. P. Freeman has been appointed

* * *

superintendent of the survey and measurement of ships, and surveyor of accommodation for seamen, at Liverpool, N.S.

* * *

A. A. Waston, a well-known shipbuilder on the Pacific coast, died recently at Victoria, aged 79. He was born in Scotland, and settled in Vancouver Island, then a Crown colony, in 1863. He designed and built a number of stern wheel steamboats for river service, and was at one time in the Canadian Pacific Navigation Co.'s service.

* * *

Mr. George A. Royal was, on the occasion of the recent Municipal and Board of Trade banquet at Collingwood, presented with the Royal Humane Society medal by the Hon. J. D. Hazen, Minister of Marine and Fisheries, for bravery and heroic conduct in saving George Crothers from drowning in the Nottawasaga River, last August.

* * *

Wm. Burton Stewart, the managing director of Norton Griffiths & Co., Canada, Limited, was born in 1870 in Lanarkshire, Scotland, and after his elementary education, attended Oxford University, taking a prominent part in football, rowing and athletics generally. In 1898 he was called to the Scottish Bar. He quit his profession, however, to serve with the Imperial Yeomanry in the last South African War. Upon his return he became private secretary to the Marquis of Linlithgow, the then Secretary of State for Scotland. He was elected to the London County Council in 1907, and shortly after joined the Norton Griffiths firm.

* * *

Mr. P. R. Warren, M. Can., Soc. C.E., chief engineer of Norton Griffiths & Co., in Eastern Canada, was educated at Malvern College, England, and took the engineering course at University College, London. He was articled to Sir John Wolfe Barry and Mr. H. M. Brunel, and was employed under them, on the construction of the Tower Bridge over the Thames, London, and on the new docks at Barry, South Wales, etc. These latter works consisted of a wet dock of 32 acres, dry docks and a deep water landing pier.

Mr. Warren has spent 10 years in the Malay Peninsula, where he was employed on extensive railway, dock and harbor works for the Colonial Government, and Messrs. Coode, Son & Matthews, consulting engineers to the British Admiralty. He was also in charge of the construction of extensive works at Singapore, which comprise a wet dock of 35 acres, a dry dock 860 feet long and deep water quays constructed in 42 feet of water.

* * *

J. Norton Griffiths, Esq., M.P., of Griffiths & Co., Contractors, Limited, of London, England, is well known in British circles as a member of one of the largest contracting combines in the world. The firm Griffithe & Co. is registered in Russia, Australia, Mexico and South America. The Canadian Business operates under the names of Norton Griffiths & Co., Limited (Canada), and the Norton Griffiths Steel Construction Co., Limited; which latter firm has been undertaking the construction of large steel and concrete buildings in the West. The first named of the Canadian companies has come into recent prominence on account of having obtained the $7,000,000 contract at Courtenay Bay.

J. Norton Griffiths, F.G.S., F.Z.S., M. P., the promoter and organizer of all these enterprises, was born on July 13th, 1871, and after being privately tutored, attended the University. Subsequent to this, he took military training and entered the army, serving in the last South African War, and becoming adjutant in Lord Robert's Bodyguard. Upon his return from active service, the firm of Griffiths & Co. was formed.

Although politically unknown until the British general election of 1910, Norton Griffiths has within a very short period won a name for himself by virtue of his able advocacy of the cause of Imperial unity, thus earning the title

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President—A. A. Allan, Montreal; **Manager and Secretary**—T. Robb, 526 Board of Trade, Montreal.

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GRAND COUNCIL, N.A.M.E. GRAND OFFICERS.

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Neil J. Morrison, P.O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
Jno. A. Murphy, Midland, Ont., Grand Conductor.
George Bourret, Sorel, P. Q., Grand Doorkeeper.
Richard McLaren, Owen Sound, Ont.
L. B. Cronk, Windsor, Ont.
Grand Auditors.

Directory of Subordinate Councils for 1912.

Name.	No.	President.	Address.	Secretary.	Address.
Toronto,	1	A. J. Fisher,	490 Concord Ave.	E. A. Prince,	61 Elm Grove, Toronto.
St. John,	2	J. F. Matthews,	50 Douglas Ave.,	G. T. G. Blewett,	65 Harrison St., St. John, N.B.
Collingwood,	3	Andrew Kerr,	Box 343, Collingwood,	Robert McQuade,	P.O. Box 97, Collingwood,
Kingston,	4	A. E. Kennedy,	395 Johnston Street,	James Gillie,	101 Clergy St., Kingston, Ont.
Montreal,	5	A. F. Hamelin,	3208 Le Tang Street,	O. L. Marchand,	St. Vincent de Paul, P.Q.
Victoria,	6	Alex McNivern,	P. O. Box 234.	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver,	7	A. S. DeGruchy,	Room 23, Williams Bldg.,	E. Read,	859 Thurlow St.
Levis,	8	Helaire Mercier,	Bienville, Levis,	Jules Lecours,	Bienville, Levis, P.Q.
Sorel,	9	Geo. Bourret,	Sorel, P.Q.,	Al. Charbonneau,	P.O. Box 132, Sorel, P.Q.
Owen Sound,	10	H. W. Fletcher,	636 4th Ave. East,	E. J. Riley,	1030 1st Ave., Owen Sound, Ont.
Windsor,	11	Alex. McDonald,	Windsor, Ont.,	Neil Maitland,	221 London St. W., Windsor, Ont.
Midland,	12	Jos. Silverthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
Halifax,	13	D. J. Murray,	Victoria Rd., Dartmouth,	Chas. E. Pearce,	Portland Street, Dartmouth, N.S.
Sault S. Marie	14	Thos. O'Reilly.	Sault Ste Marie,	Geo. S. Biggar,	Sault Ste Marie, Ont.
Charlottetown	15	J. K. Sutherland.	Charlottetown, P.E.I.,	Lem Winchester.	302 Fitzroy St., Charlottet'n, P.E.I.

of "Empire Jack." Amongst other things, he has advocated an Imperial Senate.

When in Canada, Mr. Griffiths conceived the idea of establishing a colony, of the same name as his constituency in England, the population to be drawn from the surplus of this Old Country district. The plan was put into effect, and the new colony located on Vancouver Island near the coal mines, thus affording the immigrants an opportunity of obtaining work at which they are skilled.

Mr. Griffiths is a great believer in the future of Canada and looks for its rapid development in the next few decades. He has also pointed out the great market which there is for English goods in Canada.

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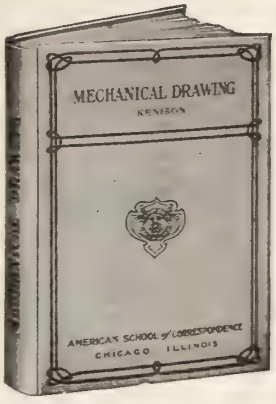
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VESSEL CONTRACTS AWARDED.

THE Collingwood Shipbuilding Company has closed a contract with the Chicago and St. Lawrence Navigation Company for a steamer which will be the largest on the Canadian register. She will be a steel bulk freighter 550 feet in length, with a breadth of 58 feet and depth of 31 feet. This will make her 25 feet longer than the Emperor of the Inland Lines, at present the largest carrier.

The motive power will consist of triple expansion engines, with cylinders 22, 42 and 60 inches diameter, with a stroke of 42 inches. Steam will be supplied at a working pressure of 185 pounds per square inch by three Scotch boilers 13 feet in diameter and 11 feet long.

The carrying capacity of the new steamer will be 12,000 tons, 2,000 tons more than the Emperor. The boat will cost upwards of $400,000. Delivery is promised for the opening of navigation in 1913 and work will be commenced on the contract immediately.

30,000 TON FLOATING DOCK.

We have information from an official source that the Russian Admiralty has recently placed an order for a 30,000-ton floating dock which is to be built by the Russian Shipbuilding Company, of Nicolaieff, according to designs prepared by Clark and Standfield, of Westminster. This dock will be 656 ft. in length overall, with a clear width between the walls of 136 ft. 6in., whilst the height of the latter will be sufficient to take a damaged ship drawing 35 ft. 1 in. The dock will be provided with workshops, and will have electric plant designed to meet the requirements not only of the dock itself but also of any ships using the dock. There will be accommodation, together with messing, culinary and sanitary spaces, for a ship crew and officers.

Pumping plant capable of lifting in two hours a vessel displacing 30,000 tons will be installed. Arrangements will be provided whereby the lifting power of the dock may, if required, be subsequently increased to 40,000 tons, either by the addition of an extra section, should the length of vessels require it, or by the utilization of a "pound" if the existing dimensions of the dock be found sufficient for these future vessels. The dock is to be fitted with a workshop having a complete machine tool equipment, and there will be travelling and stationary cranes. Anchors and chains will be provided for mooring purposes in the river Ingool, on the banks of which lie the works of the Russian Shipbuilding Company. Immediately after completion, the dock will, in the first instance, be put to service in the Nicolaieff yard, but it is contemplated to tow it subsequently to Sebastopol.—The Engineer.

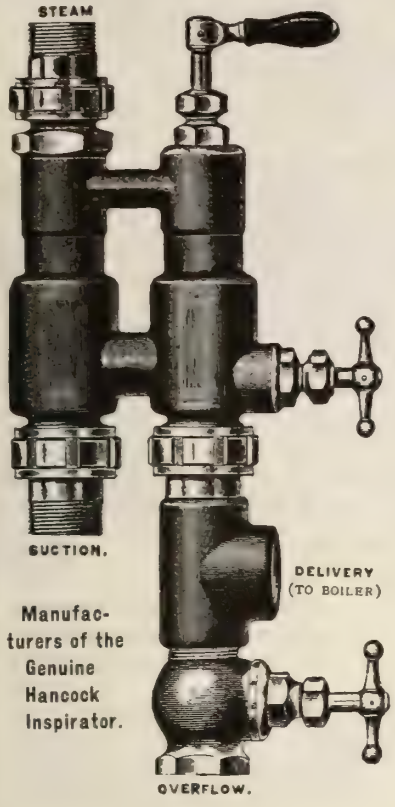
LAKE INSURANCE REDUCTION.

Lake hull rates this year will be materially reduced directly in the premium charged and indirectly by the lowering of the valuation at which ships will be insured. The new rates announced by the underwriters are complimentary to the association. Valuation this year will be $51 a gross ton. The pro rata in 1912 will be 5 3-4 per cent. To this rate 1-4 of 1 per cent. will be added for insurance attaching after August 1, and 1-2 of 1 per cent. for insurance attaching after October 1. The usual 1-2 per cent. will be added to the rate charged for insurance on vessels not enrolled in the Great Lakes Protective Association.

For fleets of strictly approved record and management the rate will be 5 1-4 per cent. This means that differentials at least in a modified form have at least come on the lakes. For the vessels which underwriters class as preferred, roughly speaking it means a reduction of 1-4 per cent., owing to the reduced valuation, and 1-2 per cent. on the rate, a total reduction as comparel with last year's rate of 3-4 per cent. for boats in the preferred class on a pro rata basis. On these vessels which are on the non-preferred list, it means that the reduction is 1-4 per cent., owing to the reduced valuation, as compared with last year. The underwriters have not announced the fleets they will admit to the preferred class.

STEAM VESSELS REMOVED FROM THE REGISTER IN CANADA, JANUARY, FEBRUARY, MARCH, 1912.

Official No.	Name of ship.	Port of Registry.	Net Tonnage.	Cause assigned.	Date of loss
77,915	Ahteck	S. S. Marie	21	Burnt	Nov. 22, 1911
75,633	Albatross	St. Catharines	317	Lost	1911
88,539	Albert	Hamilton	1	Out of existence	
80,909	Alice Brooks	Owen Sound	11	Wrecked	1884
92,308	Anderson	Collingwood	11	Broken up	
103,696	Argo	S. S. Marie	4	Sunk	1909
71,118	Beatrice	Collingwood	21	Burnt	
100,408	Beaver	Hamilton	2	Out of existence	
117,129	Chieftain III.	Kingston	147	Sunk in collision	
97,117	Circe	Collingwood	2	Out of existence	
90,698	City of Mount Clements	St. Catharines	69	Sunk	
126,250	Conveyor	Victoria	380	Dismantled	
75,647	Defiance	St. Catharines	89	Out of existence	
122,393	Distributor	Victoria	379	Dismantled	
88,292	Dot	Quebec	7	Broken up	
80,778	Eagle	Sarnia	9	Out of existence	
103,698	Edna	S. S. Marie	7	Dismantled	
97,113	Estella	Collingwood	6	Abandoned	
71,264	Fairy	Cobourg	15	Out of existence	
90,772	Forrester	Windsor, Ont.	2	Out of existence	
88,625	Gor. Gauthier	Windsor, Ont.	18	Burnt	Oct. 9, 1911
85,498	Grace Darling	Collingwood	19	Abandoned	
122,433	Hazel W.	S. S. Marie	3	Dismantled	
100,399	Henrietta	Hamilton	2	Out of existence	
100,948	Huron Belle	Collingwood	18	Abandoned	
88,535	Inez	Hamilton	2	Out of existence	
107,486	Imperial	S. S. Marie	22	Dismantled	In 1911
94,682	Interocean	Collingwood	98	Lost	
71,219	Jas. Leighton	Sarnia	14	Out of existence	
107,945	James Norris	St. Catharines	34	Out of existence	
90,691	John Hunter	St. Catharines	22	Out of existence	
103,693	John Jordan	S. S. Marie	3	Dismantled	In 1905
92,309	John William	Collingwood	10	Abandoned	
74,371	Joe Knight	St. Catharines	11	Out of existence	
80,726	Kate	Quebec	7	Out of existence	
100,409	Kildare	Hamilton	4	Out of existence	
77,911	Lady Ida	Port Hope	17	Out of existence	
111,854	Lady of Lake	Owen Sound	25	Foundered	Nov. 15, 1911
75,638	L. Shickluna	St. Catharines	11	Out of existence	
74,342	Lion	Pt. Hawkesbury	13	Broken up	
72,959	Louisa	St. Catharines	5	Out of existence	
97,112	Maida	Collingwood	2	Out of existence	
66,045	Marie	Quebec	21	Out of existence	
71,113	Mary Beck	Collingwood	11	Burnt	
94,690	May Flower	Collingwood	17	Dismantled	
111,591	Minto	N. Westminster	23	Abandoned	
100,401	Mona	Hamilton	2	Out of existence	
126,501	Operator	Victoria	380	Dismantled	
85,571	Quiddy	St. John, N.B.	19	Broken up	
103,692	Rover	S. S. Marie	3	Abandoned	
51,682	Sea Gull	Sarnia	35	Dismantled	
100,404	Secret	Hamilton	6	Burnt	Oct. 13, 1911
103,814	Skylark	Brickville	27	Broken up	
92,704	Shamrock	Winnipeg	55	Broken up	
117,122	Spry	Kingston	9	Broken up	
92,654	Union	St. Catharines	163	Sunk	In 1902
83,375	Wales	Sarnia	238	Out of existence	
96,855	Winslow	Sarnia	193	Burnt	Apr. 21, 1911
75,723	Yuba	Barrington	6	Broken up	
100,400	Ampere	Hamilton	3	Broken up	
100,406	Edna	Hamilton	8	Out of existence	
97,113	Estella	Collingwood	6	Abandoned	
75,644	G. Douglas	St. Catharines	15	Burnt	1894
107,285	Iona	Sydney, N.S.	35	Sold to foreigners (French subjects)	
116,373	James Adams	Port Arthur	35	Broken up	
72,683	Lady of Lake	Victoria	13	Dismantled	
71,116	Rescue	Collingwood	17	Abandoned	
125,121	Vandyke	N. Westminster	157	Dismantled	
	68 Vessels		3,357		



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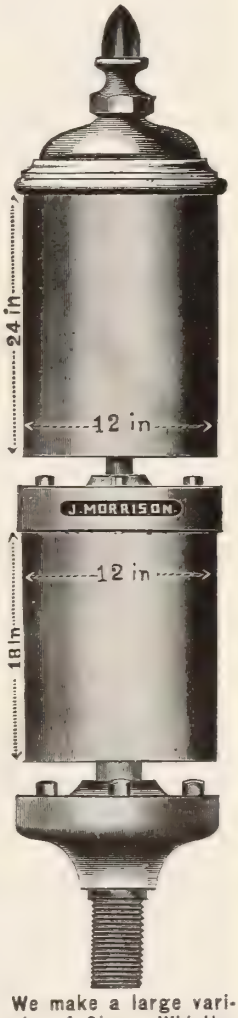
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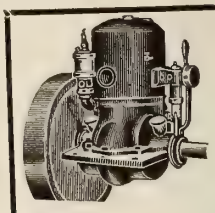
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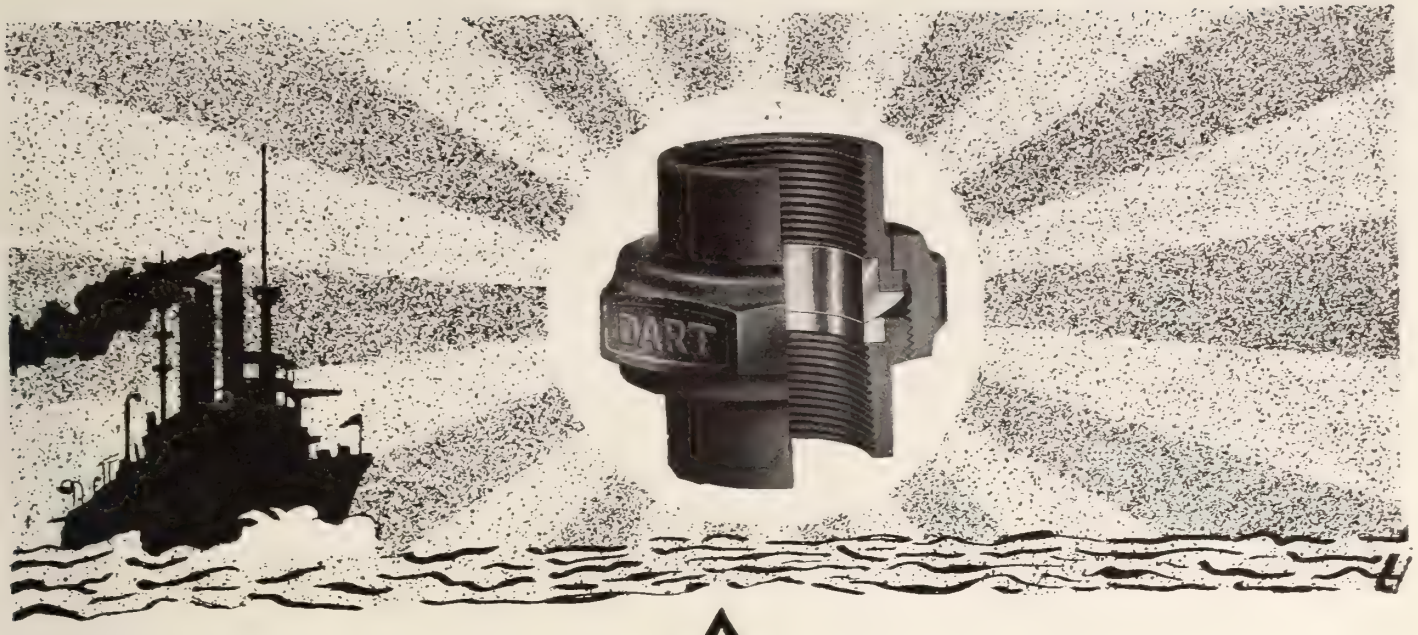

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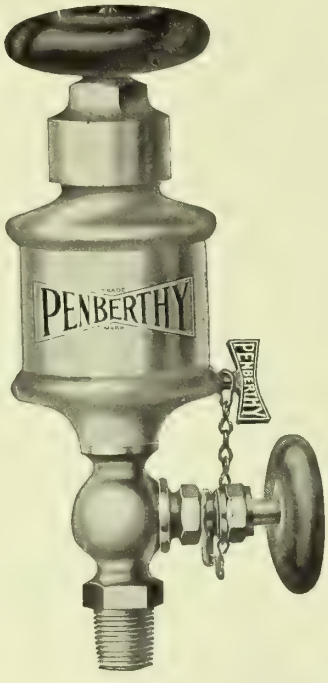
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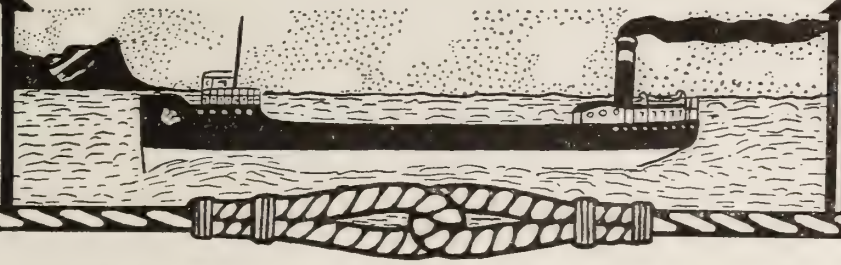
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The Souvenir Number

issued last month contained a number of specially interesting articles which have proved exceedingly popular. If you decide to send in **NOW** $1.00, as per blank below, we will include the May Souvenir issue in the yearly subscription and forward the number on receipt of remittance.

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Launch of the Dominion Government Steamer "Bellechasse"

The efforts being put forth by the Federal Government of Canada to improve and develop her maritime interests on both Lake and Seaboard are such as to ensure the commendation of every true Citizen of this Dominion and Subject of a Great Empire. The stimulus being given to shipbuilding and marine engineering, and the protection being afforded, as a result, to our commerce and shipping will contribute largely to national prosperity.

THE Dominion Government survey and inspection steamer "Bellechasse" was successfully launched from the yard of the Kingston Shipbuilding Co., Ltd., on Wednesday, May 15; the christening ceremony being performed by Mrs. Eliza Grimason— Kingston's grand old woman, who, some four days previously, had celebrated her 90th birthday. Among those present were:— Mayor Hoag; Mr. W. F. Nickle, M.P., and Mrs. Nickle; Mrs. W. Marshall, daughter of Mrs. Grimason; Mr. W. J. Fair, a director of the company, and Mrs. Fair; and Mr. J. F. McMillan, treasurer of the company. The Bellechasse is the second Government vessel built by the Kingston Shipbuilding Co., and as a souvenir of the occasion, Mrs. Grimason was presented with a beautifully engraved silver loving cup.

Dinner to Marine Men.

In the evening at the Frontenac Club, the directors of the Kingston Shipbuilding Co. entertained at dinner a number of marine men who had come to the city, to attend the launching of the Bellechasse, and needless to say the function was a most pleasant and successful finale to the day's proceedings. Mayor F. J. Hoag occupied the head of the table, and among those present were:—C.F. Duguid, representing the Department of Marine and Fisheries, Ottawa; H. Calderwood, Toronto, of the Underwriters' Association; L. L. Henderson, managing director of the Montreal Transportation Co.; Capt. Robert Fraser, local manager of the Montreal Transportation Co.; J. S. McIntyre, and J. F. McMillan, superintendent and treasurer of the Kingston Shipbuilding Co., respectively; John Donnelly, local marine inspector, Dr. A. W. Richardson and Ald. W. J. Fair.

Toast List.

The toast of the Kingston Shipbuilding Co., proposed by Dr. A. W. Richardson, was cordially received and responded to by Ald Fair, on behalf of the directors. He expressed great pleasure at meeting so many prominent marine men, and regretted that more of the local directors were not present. Mr. John McKelvey being unable to attend owing to illness, and Mr. H. A. Calvin on account of a previous engagement. Mr. Fair was sure he voiced the sentiment of the whole board, when he acknowledged with much gratification, the support the company had received from the people of Kingston since its inception two years ago. There was some opposition then to the incorporation of a new company, to take over the government dry dock, but he had confidence in their ability, to make a success of the enterprise, and to-day he was proud of his connection with an institution, which had brought so much prosperity to the city. He hoped for greater possibilities, in the future.

On behalf of the board, Mr. Fair thanked the Hon. William Harty and W. F. Nickle, M.P., for their valuable assistance, in the past, and predicted that before the new Welland Canal was in operation, the Kingston Shipbuilding Co., would own and operate a dry-dock capable of docking the largest ships entering the harbor. The present government had decided on harbor improvements on a large scale, sufficient to take care of any number of vessels, requiring winter accommodation. This would bring work to the various labor interests, and to none more than the Kingston Shipbuilding Co.

L. L. Henderson, managing director of the Montreal Transportation Co., said he had his misgivings, as to the success of the new enterprise, at its inception,



DOMINION GOVERNMENT STEAMER "BELLECHASSE" ON THE STOCKS PREVIOUS TO BEING LAUNCHED.

but was convinced that the Kingston plant was a great marine necessity, and judging by the new vessel just launched, he had no fear for the future of the company. They could get their vessels repaired quicker and cheaper than when the dry dock was operated by the government, without machinery and plant so necessary to meet marine requirements. He hoped to see a larger dock, and predicted better things when the new Welland Canal became a reality.



LAUNCH OF THE DOMINION GOVERNMENT STEAMER "BELLECHASSE."

In response to the toast, "The Minister of Marine and Officers of the Department," Mr. C. F. Duguid, chief naval architect, expressed pleasure at being present. It was the first time he had the pleasure of acknowledging their hospitality, and he would certainly convey to the Minister and his Deputy the many good wishes of the Kingston Shipbuilding Co. He spoke of the great possibilities in Canada of the business and stated he had found during his short experience in this country, that Canada could build ships as well as they could in the old country. He also thought it possible that it would fall to the lot of the Kingston Shipbuilding Co. to build the first ship in Canada to use fuel other than coal, and was not sure but that the plans of the new steamer Dollard might be changed to oil burning instead of coal. His relationship so far with the officers of the Kingston Shipbuilding Co. was very gratifying and he hoped that as the result of their workmanship they would be kept busy with more government contracts.

Mr. Hugh Calderwood, speaking for the Underwriters' Association, claimed that the great question of vessel transportation called for various requirements after the ships were built. The whole fabric was in need of constant repair and to meet this expenditure, the underwriters stood between the marine man and the loss. He had every confidence that before many years, vessels of the 600 foot type would be carrying grain from the West to Kingston, and as they had to be built in Canada, he believed the Kingston Shipbuilding Co. would participate in the work.

Mr. Calderwood regretted that none of the Western Directors were present, particularly the president, Mr. S. Dyment, and Mr. James M. Smith. In his opinion, Mr. Smith was one of the most successful naval architects in this country.

After an interesting speech from Dr. A. W. Richardson on "The Possibilities of Canada," and particularly the transportation problem by water, the mayor concluded a very pleasant evening by pledging the support of the council and the citizens as a whole, to the welfare of the new enterprise, of which they were all so proud.

Mr. McIntyre, superintendent of the company, invited all those present to a similar function at the launching of the Government steamer Dollard.

Vessel Particulars.

The "Bellechasse" has been built to the order of the Department of Marine and Fisheries of the Dominion Government, and is of steel construction throughout. The vessel's length overall is 142 feet, moulded breadth 27 feet, and moulded depth 13 feet 6 inches. She has three decks—lower, main and boat decks. The deck house, located on the main deck and built entirely of steel, contains staff dining saloon, pantry, officers' cabins, officers' mess room, galley, bath rooms, etc. The staff quarters are placed on the lower deck aft, while accommodation has been provided for the seamen and firemen on the lower deck forward. The chart house and wheel house, constructed of teak, are located on the boat deck.

The outfit will be as required by the Canadian Steamboat Inspection Act and will include gasoline launch, life boat and dinghy. The vessel will be electrically lighted throughout and will be equipped with a powerful searchlight and the latest aids to navigation. The accommodation is comfortably arranged, and the furnishings are the best of their kind.

The propelling machinery consists of two sets of inverted vertical direct-acting triple expansion surface condensing engines, capable of developing 1,000 indicated horse-power when running at 140 revolutions per minute with 180 lbs. working steam pressure. Two single-ended Scotch boilers, fitted with Morrison's patent withdrawable furnaces and equipped with Howden's forced draft system together with other latest improvements supply the necessary steam.



DOMINION GOVERNMENT STEAMER "BELLECHASSE" IMMEDIATELY AFTER BEING LAUNCHED.

The Bellechasse, which is built to

Lloyd's class 100-A.1., will, on completion, be delivered to the Department at Quebec, below which she will be engaged in survey and inspection work on the St. Lawrence river ship channel.

LAUNCH OF THE "IMPERATOR."

IN our January issue this year, we gave a brief outline of the leading features of this ocean leviathan, accompanied by an illustration of the vessel as she would appear when completed. The Imperator has recently been launched, and the Hamburg-American Line, her owners, now possess the largest ship afloat. It is understood that she is the first of three similar vessels, now under construction, to take the water.

Her keel was laid on June 16, 1910, and some idea may be gathered of the work necessary in constructing her double bottom and placing the 550 ribs in position from the fact that it was not until the early part of this year that one could see anything that would indicate to the layman that she was going to be a ship. When she took the water her weight was 27,000 tons. She has been constructed under the direct supervisions of the Germanische Lloyd and allied societies, whose rules and regulations are the most stringent in existence, and her hull is fitted with the largest number of bulkhead watertight compartments ever installed in a vessel. These compartments number 36 in all, and will extend from the second deck, far above the waterline, right down to the double bottom. Twenty-three of these have been fitted with the Stone-Lloyd hydraulic system for closing the bulkhead doors.

In emergencies the doors are closed simultaneously from the conning-bridge, but may each be opened at the station, although the door again automatically closes within a short period, provided the gear on the bridge is in the closed position. At all times, the state of the door is indicated on a disc on the bridge. Each individual door, too, can be closed independently from the upper deck by a mechanical contrivance.

Passenger Equipment.

The number of passengers for whom provision is made is as follows:—First-class, about 700; second-class, about 600; third-class, about 940; and fourth-class, about 1,750, of which 1,000 are in rooms and 750 are in several large compartments. The crew numbers about 1,100. Thus the total number of persons on board when the ship is full will be about 5,100. All the cabins in the ship are of unusually large dimensions, and every care has been taken to ensure the convenience of all passengers, as well as of the crew. In addition to the ordinary large first-class cabins, several special suites are provided, consisting of sitting-room and bed-room, with bath and w.c., and, in addition, there are two elegant suites, "Imperial" suites, consisting each of a saloon, a breakfast-room, two sleeping-rooms, two bath-rooms, and w.c.



LAUNCH OF THE "IMPERATOR."

For general use there are provided for the first-class passengers two main saloons, a restaurant and winter garden —exact replicas of those at the Carlton Hotel; large hall, ladies' room, smoking-room, veranda cafe, and a large swimming-bath, identical with that at the London Automobile Club. In addition there are hygienic, warm and hot air, steam, electric, and carbonic baths, one room for cold water treatment, one massage room, and one large and convenient resting room. For the passengers of the second class there is a large dining saloon, smoking saloon, social room, hall and a gymnasium. For the passengers of the third-class, dining, smoking and reading rooms; and for passengers of the fourth class, a large dining room. There are promenade decks of ample area for all classes of passengers. Comprehensive cooking and domestic arrangements on the most practical basis are provided. Kitchens, pantries, and sculleries are to be fitted for all classes of passengers, and these are equipped with the most recent and requisite contrivances, including bakeries, confectionery, and butcher's departments. The provision spaces are extremely large, and ample cold storage is provided.

Ship Equipment.

A light schooner rig, consisting of two masts, combined with three huge funnels arranged between the masts, gives the ship a sightly appearance. Both masts are equipped with loading and unloading apparatus to an ample extent, and electric cranes are fitted for the rapid and convenient handling of cargo and baggage. The anchor and mooring arrangements for the ship are of a size to correspond with its great bulk. The weight of the anchor and chain amounts to about 200 gross tons, the diameter of the metal of the individual links being 3.94 in. For rescue work, the safety arrangements are on the largest scale, and each person is to be provided with a life-belt and life-buoy, which, by means of electric con-



THE "IMPERATOR," AFTER THE LAUNCH, BEING TOWED TO HER FITTING-OUT BERTH.

tact with the navigating bridge, can be distributed in great numbers. Owing to the number of boats provided on the vessel—100, the means of safety for the passengers is most favorable. In respect to boat-launching, the most suitable design has been adopted. As with all new ships, the arrangements for wireless telegraphy are extensive, and there are fitted submarine signalling appliances.

The Imperator has quadruple screws, and by reversing one or two of her propellers it is possible for her to turn 16 points on her own axis.

Ship Lighting and Fire Provision.

The electric installation includes five turbo-dynamos for a lighting circuit comprising about 10,000 lamps, and for a power-circuit to run motors of a collective horse-power of 850. There are, for instance, four passenger lifts, several provision lifts, post and packing arrangements, four rotary cranes for picking up provisions and luggage, and working the lifeboats. Further, the mechanical appliances in the kitchens and pantries are electrically worked. The installation in the conning-tower, the telegraph and heating apparatus, dock and rudder telegraphs, are also electrically worked. There is a loud-speaking telephone installation, which connects the various rooms with each other, as well as provision of electric clocks, electrically worked from the chief clock on the bridge, and also an electric alarm, which is capable of rousing the entire crew by operation from the conning-tower.

In addition to the large electric generating installation, there is a generator on the top deck, which, in case of breakdown of the main installation, would supply current for lighting the gangways, the most important of the work-rooms and all the boat decks. This set also supplies current for working the installation of the conning-tower and the wireless telegraphy apparatus. The dynamo in this case is driven by an internal-combustion engine, so that its working is secure, even in the event of the flooding of the boilers, in the stokeholds. For the convenience of passengers, an electric bell installation is fitted.

In order to afford security in case of fire, there is a fire station, and a recording apparatus, on the Rich system on the bridge to announce any outbreak, and through its tell-tale tubes from each hold or compartment, steam can be forced to extinguish the fire at the moment of outbreak. Moreover, water extinction is provided for throughout the ship by a large number of fire hydrants. On the passenger decks iron fireproof doors prevent fire passing from one division to another.

For ventilation purposes about eighty "Sirocco" ventilators, with a total of about 19,000 cub. m. capacity, are provided. The rooms of the fourth class are provided with thermo-tanks for ventilation and heating. In addition, there is abundance of natural ventilation. An ozone installation is introduced to sweeten the air of the rooms. To avoid rolling in heavy seas, Frahm's anti-rolling tanks have been installed.

Propelling Machinery.

Four 4-bladed propellers drive the ship, their diameter being about 16½ ft. They are driven by a turbine installation at a normal rate of 185 revolutions per minute. The individual turbines are arranged so that the steam passes through the high-pressure turbine on one inner shaft, to an intermediate pressure turbine on the other inner shaft, and finally to both low pressure turbines on the outer shafts. Each separate shaft is capable of being worked and manoeuvred independently.

CARTOON SERIES.

By arrangement with and courtesy of our contemporary, "The Syren & Shipping," London, England, we will reproduce each month a selected cartoon from the series now appearing in that journal. The first of these—"Types of British Seamen," appears in the present issue, and makes a possibly appropriate centrepiece to the article concerning the "Disappearance of the British Tar."

The reversing turbines consist of two high pressure and two low pressure units, with the latter again on the outer shaft. The largest low pressure casing has a diameter of about 18 ft., and a length of about 24 ft. 7 in. Two condensers are arranged near to the low pressure turbines. The water-circulating pumps, four in number, are arranged two each on one engine, which drives both or either. The boilers, located in water-tight compartments, provide steam at a pressure of 250 pounds per sq. inch.

The Imperator is 881 ft. long, 98 ft. beam, and 35½ ft. molded depth, and the entire interior surfaces of her bunkers have been coated with Briggs' bituminous enamels and solutions. The speed of the vessel at sea will be 22 knots per hour. She was built at the Vulcan yard in Hamburg, while her sister ships are being built by Blohm & Voss. The Emperor of Germany was the chief figure at the launching ceremony.

THE BRITISH TAR DISAPPEARING

THE deterioration of the personnel on board her trading-ships threatens England's supremacy on the sea, says Mr. Spencer Campbell in The Fortnightly Review. Most of the crews in such ships are aliens not in sympathy with the British Empire, and on some occasions these crews have even manifested a hostile spirit. When war, a few years ago, hung in the balance and grave uneasiness developed between the United Kingdom and a "certain Great Power," her cruisers overtook and and searched British merchantmen. One of these latter, the Cheltenham, had but four English seamen aboard. The rest were Germans, and as the searchers left the steamer, the German crew enthusiastically cheered them. This writer proceeds:

"The power invested in a captain is very wide; suppose then, a collier commanded by an alien at the outbreak of war. What is there to prevent him steering into the nearest hostile port, and presenting the enemy with a valuable cargo? Multiply a few similar instances, add a well-organized mutiny or two, remember the facilities for espionage, do not neglect the thousand and one opportunities for Morsing or semaphoring false information to a scouting cruiser, and one has the sum total of the damage which could be inflicted on the Nation by the presence of alien officers and men under the Red Ensign. One shudders at what might have happened aboard the Cheltenham had war really been declared. What a hollow mockery is 'Rule Britannia!' "

Other nations, we are told, are more cautious and make every effort to have their ships manned by their own people, even if they begin by employing foreign officers or engineers. Mr. Campbell thus cites the example of Germany:—

Germany's Practice and Example.

"It is a matter of common knowledge that Germany has bought many steamers from us second-hand, and it has been the ordinary custom in many cases for the engineering staff, at least, to remain on. We are, therefore, induced to picture the said engineers growing grey under the German flag—or possibly stout under the German beer. A pretty idea, no doubt, but doomed, alas! to be shattered ruthlessly. It has been the fixed idea in all German steamship concerns to replace the original staff by German substitutes; but in this there is no needless hurry. Until the German officers have mastered the work, there is no question of the dismissal of the British; yet, when the moment arrives, when the engines run just as smoothly under Teutonic hands, the change is effected.

Only a short time ago, one of the leading firms announced in the annual report that every member of the staff, who had come over in their vessels purchased abroad, had now given way to a German successor."

Japan's Practice and Example.

Japan's merchant marine tells the same story—

"At the beginning practically every officer aboard was British; now only a skipper is to be found on some of the passenger vessels. It will not be long before he, too, will be a rara avis on the bridge of a Japanese steamer. It is natural, nay, inevitable. A country must study first the interests of her own flesh and blood, for it is only from her own flesh and blood that she will get the best results. Something is wanted in England of the spirit which animated the Kaiser's proud vaunt about his yacht, Meteor—'German-built, German-fitted, German-manned!'

"Why, then, should our leaders quail before this retaliation? Our navigators and our engineers are serving under many a foreign flag, but the time of their service is measured by the time of their usefulness. When their brains have been picked, and the pupil has shown himself the equal of the master, then comes the dismissal, to be followed by many a weary day of waiting, until some berth is secured. No maudlin sentimentality is allowed to sway the judgment of the alien ship-owner, with the natural consequence that their merchant service is invested with a robust vigor and cohesion sadly lacking in our own."

British Supremacy at Stake.

Mr. Campbell thinks that if the Government were to subsidize merchantships it would solve the problem by enabling ship-owners to pay British wages to British sailors instead of employing lascars, coolies, or "dagoes" at starvation pay. The rule of the American navy to employ none but American citizens on American warships is cited as an example for England's mercantile navy to follow. If this rule is not adopted, we are assured, it will spell ruin to the Empire.

"The loss of our mercantile marine will mean nothing else than the destruction of the British Empire, for that Empire is essentially an Empire of the sea. It rests upon two supports—the navy in the first instance, the merchant service in the second, and each support is necessary to the other. If we lose the supremacy of the sea, the ocean which unites and welds our Empire will then divide it—there will be a falling asunder of the parts and eventual dissolution. . . . Whether it is an immutable law of nature that every Empire in due course of time must crumble and decay, or not, it is certainly a fact that a long period of supremacy breeds a numbing lethargy, a contemptuous self-confidence, and a marked dislike to facing unpleasant details. During the last few years this canker has eaten its way into the British people. We have been granted great things, and it needs a strong and determined effort to awaken to our responsibilities. Otherwise we shall realize the grim truth of the old saying. 'To help fools, even the gods are powerless.'"



TYPES OF BRITISH SEAMEN.

Wireless Telegraphy. — It is stated that since the begining of 1909, a period of three years, the passengers on no fewer than 22 shipwrecked vessels have owed their lives to the fact that the ships were equipped with a wireless telegraph system, and were consequently able to send out messages for assistance.

THE ENGINE ROOM STAFF OF THE TITANIC.

By D.V.M.

THE engine room staff of the "Titanic," thirty-five in number, died to a man at their posts, says the report. Why should this be? What object, when doom was visible in every sign around them, could engineers and electricians have in sticking to their posts? Was it merely to light the launching of the boats?

Worked to Save Ship.

Who could doubt the answer? No seagoing engineer was ever in a breakdown without thinking out a plan, good or bad. There was a scheme amongst the engine room staff below decks to fight the inrush. The word went round that if only this spare centrifugal could be got running, if only the fitters had light in that tunnel, if only the nozzle of a compressed-air tube could be carried through that partition, if only enough sacks of stuff could be dropped over against that bulkhead door that wouldn't close, if only — a multitude of "only's" — the enemy could be fought and baffled after all. To it they went, hammer and tongs, lever and chisel, pints of sweat and many a good round oath. Such battles have been fought before now, the ship has come to port, the engineers have become a wonder in the papers.

Of these men, no superficial sensation shall be written that rests upon a single word of theirs. A few may have floated dead to the surface; but, for the bulk of them, two miles depth of water divides them from the reporters; their lips are sealed with a pressure of two tons to the square inch; their drama is a thousand times more thrilling than anything recorded, for it remains a profound mystery.

Hugo's Ninety-Three.

Of all the duels that have been written, surely no duel could be more impressive than that in Victor Hugo's "Ninety Three," the duel between the gunner and his gun. The gunner lashed it carelessly, a storm arose; the cannon broke loose, spread chaos all over the lower deck, maimed men, knocked holes in the vessel's side, and defied all efforts to control it. The gunner, whose fault it was went down below, armed only with a crow-bar and a coil of rope. In the semi-darkness, this man fought the cannon a long duel, risking his life. He won, and the cannon was lashed up. A great personage was aboard. This personage had the marines drawn up on the quarter-deck and there he pinned upon the gunner's breast an emblem of great honor. The drums beat, the marines presented arms. 'And now,' said the donor of the honor, 'let that man be shot.'

"Titanic's" Engineers Had Similar Reward.

That, more or less, is the case of the engine-room staff of the "Titanic, except that they have committed no fault. They fight like demons, they disdain all chances of escape, they forget everything in their contest with time and water to bring the ship to port. And then, some inscrutable power, that none of us can ever comprehend, says coldly, "Now let these men be drowned." and down they go, every man of them at his post, to the ocean bed two miles below, where fishes cannot live, and where even the germs of putrefaction will probably find life impossible. No halting halfway between top and bottom, suspended between two kingdoms like the coffin of Mahomet, as some would have it. Right down, down, down, gaining specific gravity as she descends and feels more pressure, the modern "Titanic and her engineers are among the wrecked galleons and four-deckers and Clyde-built clippers, in the museum of Davy Jones. Half-a-mile off along the bottom, perhaps, lies Don Diego Gonzalez de la Gonzalera in his state cabin, driven from his course three centuries ago and sent down also by an iceberg. Small need he has of his great jack-boots for walking. Elsewhere sits Vanderdecken who died blaspheming in his wreck, his eighteen pairs of breeches clipped tightly to his legs and his Bible held closed by a pressure of one hundred tons. If they could come visiting, and if there were light, they might wonder at the "Titanic" electrician clinging to his queer switchboard and his comrades riveted by feet or hands to any flat surfaces that they pressed against as they went down.

Fanciful Finale of the Big Ship.

The "Titanic" must have become heavier specifically as she sank, for whereas the water around her was incompressible, some of her own materials were otherwise. Wood, rubber, draperies, and fabrics of many kinds grew more compact with hydraulic pressure as she descended.

Among the first things to cave in is Colonel Astor's Thermos flask; the salt water oozes through the corks in the wine cellar; it breaks in the lids of the oil canisters in the engine-room stores. Lower down, perhaps, the electric lamps begin to pop—unheard, for no ear can work at such a pressure—the eggs in the pantry succumb and turn to omelets, bottles collapse, sardine and tomato tins cave in. Was there ever a back-pressure valve steam and water tight? If there are such rarities on the "Titanic," now woe betide her boilers. At twenty times normal pressure even steam pipes may easily collapse. The condensers may have given in much earlier, it is too dark to see. Already, water has stolen into the engineer's watch, and the man on duty in the engine room, who kept the engineer's log, has his fountain pen filled to the nib with a dark-blue fluid, enough to write a history of the wreck. Why doesn't he write?

All that is left to you and me, we do the talking of it.

We land-lubbers have to prepare plans and six months are given us to turn out a specification. If our schemes fail, what happens? We may lose a little prestige, but most of us live it down, come up smiling at Institution meetings, and in time win quite a reputation. The seagoing engineers and staff of the "Titanic" had, however, only a few minutes to get out their plans. only three hours to execute them. The price of the contract was ten million dollars and nearly two thousand lives. They failed—the contract may have been impossible, and their penalty for delay in completion—time being of the essence of the contract, was death.

All Honor to Them.

"May the earth rest lightly on them," we cannot say; it is a vain wish even of the water. "How can man die better than facing fearful odds" is the thought that naturally occurs to one, and though we cannot envy them their fate, and would rather die in our beds, we must all doff our hats in sincere reverence to the men who voluntarily went down to the bottom in their ship, fighting the common enemy rather than fighting, each man, for his life.

These were their names:—J. Bell, chief engineer; W. Farquharson, senior second; N. Harrison, H. J. Hesketh, junior seconds; G. F. Hosking and E. C. Dodd, senior and junior thirds respectively; L. Hodgkinson and J. M. Smith, senor and junior fourths.

The electricians were P. Sloan, chief electrician; A. S. Alsopp, second electrician; H. Jupe, A. Middleton, N. Kelly, and A. Ervine, assistant electricians.

The rest of the general engineers, from senior assistant down to assistant deck engineer, were:—B. Wilson, J. Shepherd, H. G. Harvey, C. Hodge, F. G. Coy, J. Fraser, H. R. Dyer, A. Ward, R. Dodds, T. Kemp, F. A. Parsons, W. D. Mackie, R. Millar, W. Moyes, W. M. E. Reynolds, H. Creese and T. Miller. Then also, there were boilermakers G. Chisnall and H. Fitzpatrick; A. Rous, plumber, and W. Duffy, writer.—Electrical Times.

Marine Department of the Canadian Pacific Railway Co.

The opening up of the Dominion of Canada, which the advent and development progress of this great railroad corporation has accomplished, would have been retarded and made to some extent abortive, had the men responsible for the administration of the C. P. R. neglected to provide means whereby overseas settlers, lake and coast communities could be comfortably and conveniently transported as and when opportunity knocked at the door.

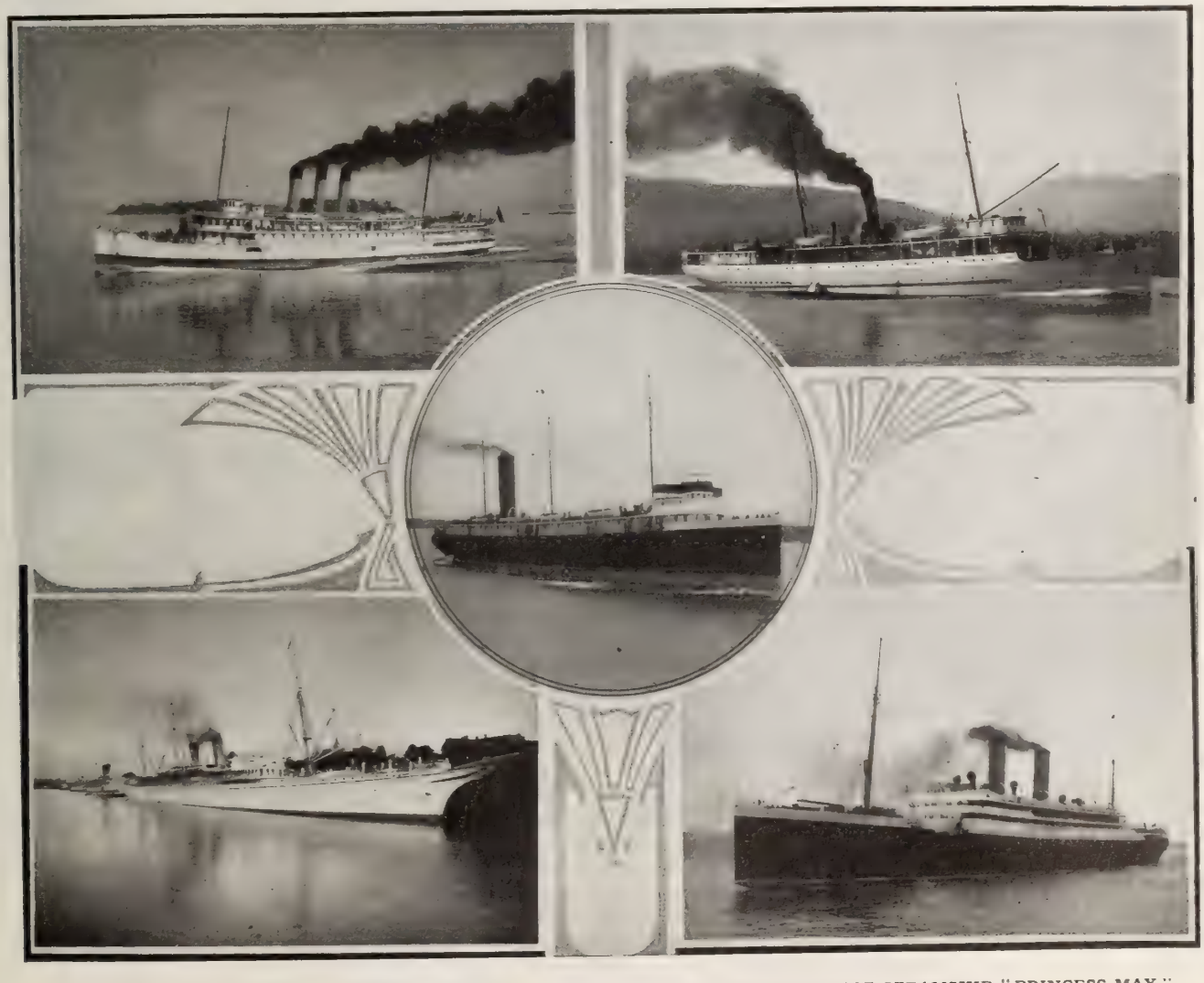
THE fleet of the Canadian Pacific Railway consists of sixty-seven steamships of twenty different types and comprises a number of the most up-to-date examples of Naval Architecture and Marine Engineering to be found among the great steamship companies of the world.

Early History.

The history of the Canadian Pacific Railway Company, as steamship owners, dates back for more than a quarter of a century, for it was early in 1883 that the company contracted on the Clyde for the construction of three steel screw steamships, the "Algoma," "Alberta," and the "Athabaska," for service on the Great Lakes, between Owen Sound, Port Arthur, and Fort William. This was made necessary by the difficulties encountered, and consequent delay entailed, in the completion of that scenic section of the main line, which stretches along the north shore of Lake Superior. The inauguration of this service across the Great Lakes, which is still one of the most popular and profitable of the many ramifications of the Canadian Pacific Railway—marked a distinct step towards the completion of that great highway across the Dominion, which has proved such an important factor in binding together the Canadian provinces as a nation. The "Algoma" was replaced in 1889 by the "Manitoba," and in 1907 were added to this service the magnificent Clyde built steamships the "Assiniboia" and "Keewatin."

Trans-Pacific Service.

Following the completion from ocean to ocean of the main line of the Canadian Pacific Railway in 1885, came the problem of finding eastbound traffic for the road, in order to avoid hauling empty cars over the mountain ranges lying be-



PACIFIC COAST STEAMSHIP "PRINCESS VICTORIA." PACIFIC COAST STEAMSHIP "PRINCESS MAY."

LAKE STEAMSHIP "ASSINIBOIA."

PACIFIC LINER "EMPRESS OF JAPAN." ATLANTIC LINER "EMPRESS OF BRITAIN."

PROMINENT CANADIAN PACIFIC RAILROAD CO. STEAMSHIPS.

tween the Pacific coast and the already productive cattle ranges and wheat fields of Western Canada. The possibilities of attracting a portion of the traffic of China and Japan, from the Suez Canal to the Canadian Pacific route, appealed to the management, and resulted in the establishment, in 1887, of the trans-Pacific service with the chartered steamships "Batavia," "Parthia" and "Abyssinia." They remained on the route until 1891, and were replaced by the world-renowned "Empresses" of "India," "Japan" and "China," which at that time set a mark for comfort, safety, regularity of service, that has scarcely been equalled, and never surpassed in the history of ocean travel. Two new vessels, the "Empress of Russia" and the "Empress of Asia" are presently under construction on the Clyde for this route.

Inland Lakes Service.

The car ferries "Ontario" and "Michigan," (very appropriately named), were built and put into service between Windsor, Ontario, and Detroit, Michigan, in 1890, at which time the Canadian Pacific Railway first became a factor in the great traffic between Chicago, the Western States, and the Atlantic seaboard.

The next move in the expansion of the Canadian Pacific Railway Company's steam navigation interests came in 1896, when the approaching completion of the Crow's Nest branch, and the growing traffic of the Kootenay, Columbia River, and Okanagan Districts, led to the acquisition of the Columbia and Kootenay Navigation Co., with its fleet of stern wheel steamers, tugs and car barges. These have since been added to and improved until the British Columbia Lake and River service of the Canadian Pacific Railway is not only popular with the traveling public, but it is an alternative link in it's transcontinental chain.

Pacific Coast Service.

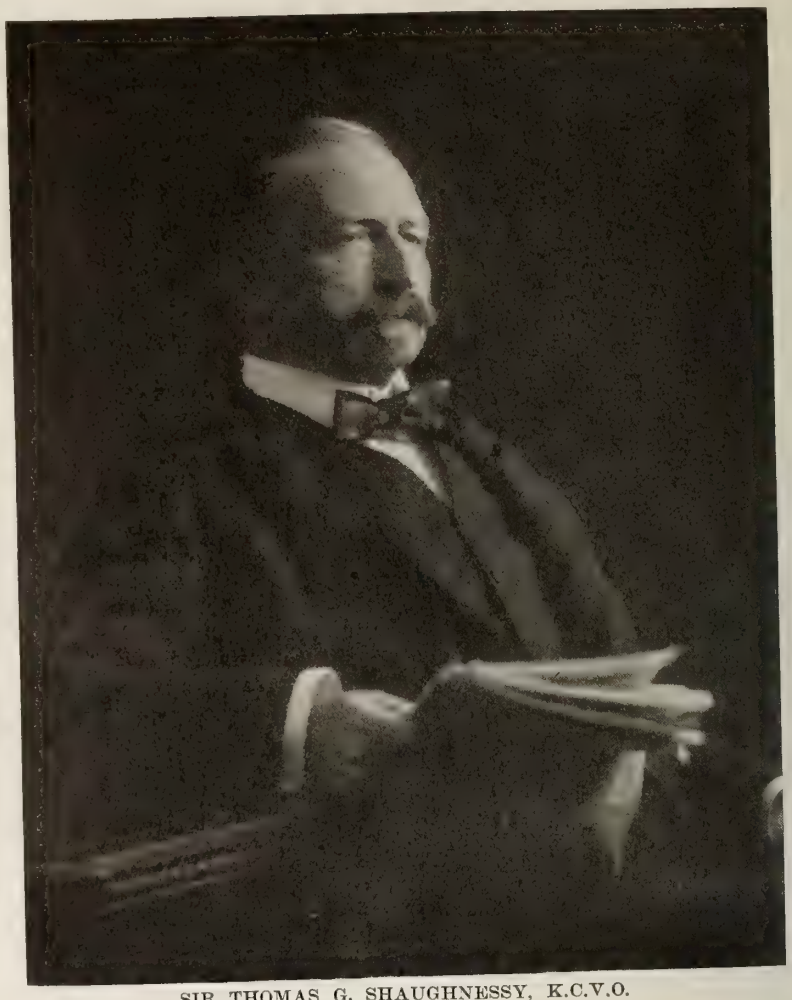
In 1897 came the Klondyke rush, and the urgent necessity for providing accommodation from Vancouver and Victoria up to Skagway and the gold fields, for the rush of prospectors. To secure a portion of this business, led to the purchase of the steamships "Tartar," and "Athenian." These two vessels were afterwards transferred to the trans-Pacific service, and were replaced by some of the vessels of the Canadian Pacific Navigation Company, a corporation which was acquired by the Canadian Pacific Railway Company, in 1903, and is now known as the British Columbia Coast Service. The ships of the fleet cover the coast from Seattle to Skagway, and are sometimes known as the "Princess" fleet. The best known of these ships are the "Princess Charlotte," and "Princess Victoria."

There have recently been added the "Princess Patricia," the "Princess Sophia" and the "Princess Alice." These magnificent steamships perform a service without parallel in the history of steam navigation—the triangular run between Vancouver, Victoria and Seattle and return every twenty-four hours, a distance of 339 miles, with three stops of approximately two hours each. At each stop they take on board an entirely new set of passengers, and the ship is cleaned, coaled, watered and provisioned, all in the short time between speeding the parting and welcoming the incoming guests. This exacting service they perform week after week, day in and day out, with remarkable regularity.

Trans-Atlantic Service.

In 1903, the Canadian Pacific Railway bought from the Elder Dempster, Co. fifteen of their largest and best steamships, and established the Atlantic services to Liverpool, Bristol (Avonmouth), and London. The following year the London service was extended to include the port of Antwerp resulting in the building up of a large trade with the latter, both in cargo and passengers.

The year 1906 marked the establishment of the service between Quebec and Liverpool by the superb "Empresses" of "Ireland" and "Britain," which have been such a strong factor in popularizing the matchless St. Lawrence route, not only among Canadians but also among the people of the United States, especially those of the middle and western sections. These steamships, carrying a maximum of 1,500 passengers of all classes, and sailing once a fortnight, since their advent to the St. Lawrence route, have created so much new business, that the existing lines, both the Canadian Pacific and their competitors, have experienced no falling off in their carryings.



SIR THOMAS G. SHAUGHNESSY, K.C.V.O.
President the Canadian Pacific Railroad and Steamship Co.

The "Monteagle" was transferred from the Atlantic to the Pacific service in 1906, on which occasion the son of Sir Thomas Shaughnessy, the President of the Canadian Pacific Railway, with his tutor, traveled eastward from Montreal clear around the globe on a Canadian Pacific ticket, and were on a Canadian Pacific train or ship the whole of their journey, which may be a prediction of what the future has in store in the extension of this company's services.

ELECTRIC PROPULSION OF SHIPS.

THERE is much discussion proceeding just now as to the incompetence of a turbine driven ship to pull up in a reasonable distance. A French paper has been arguing from the Titanic disaster that every ship should have brakes; but, more seriously, marine engineers are coming to realize how perilous a thing it is to over-engine a boat for going ahead if she is also under-engined for going astern. The Titanic had 43,000 shaft h.p. ahead, but she had only 27,000 s.h.p. astern. What chance have such boats, when going full speed ahead, of arresting themselves within safe distance of an obstacle reported in the night watches? There is one, and only one satisfactory remedy; the use of electrical transmission for coupling the propellers to the turbines. The speed of reversal, its effectiveness, and the ability to use every horsepower originally at work in the forward direction, are advantages that must surely force themselves upon the older generation of designers who seem to be prejudiced in favor of anything whatsoever that is not electrical.

PANAMA CANAL.

THE miter gate moving machinery for the first leaf completed in the construction of the Canal was tested in operation on May 13. The west leaf of the upper guard gate in the east chamber of Gatun Locks was swung from halfway position to closure, opened fully, closed, and drawn back to halfway position. The complete revolution of the bull wheel, a strut from which moves the gate, occupied one minute and forty-eight seconds, which is 12 seconds less than the time required in the specifications. The machinery worked perfectly, swinging the 448 tons of steel in the gate proper, which is 54 feet high, 65 feet long and 7 feet thick, under perfect control, and without noise or vibration. The operation was witnessed by a number of officials and engineers whose work has been connected with the construction of the locks, gate and operating machinery.

COMMITTEE ON BULKHEADS AND WATER-TIGHT COMPARTMENTS.

THE president of the British Board of Trade has appointed a technical committee to advise him in the interests of safety of life at sea, with regard to the internal sub-division of vessels of all classes by water-tight bulkheads and other means. The reference to the committee is to advise:—

(1)—As to what in their opinion would constitute efficiency sub-division with regard to each of the classes of vessels included in the rules for life-saving appliances made by the Board of Trade under Section 427 of the Merchant Shipping Act, 1894, having due regard to the nature of the service in which they are respectively engaged.

(2)—Whether, independently of the foregoing, the committee desire to make any recommendations with reference to the sub-division of vessels already built, or of new vessels, which would in their opinion contribute to the safety of life at sea.

The committee is constituted os follows:—Mr. Archibald Denny, LL.D. (Chairman), of Messrs. William Denny & Bros., Dumbarton, naval architect; Mr. James Bain, late superintendent engineer of the Cunard Line, engineer; Mr. H. R. Champness, M.V.O., Assistant Director of Naval Construction, Admiralty; Mr. G. B. Hunter, D.Sc., of Messrs. Swan, Hunter & Wigham-Richardson, Limited, Wallsend-on-Tyne, naval architect; Mr. Summers Hunter, of the North-Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne, engineer; Mr. J. Foster King, Chief Surveyor of the British Corporation for the Survey and Registry of Shipping; Mr. Andrew Laing, of the Wallsend Slipway and Engineering Co., Ltd., Wallsend-on-Tyne, engineer; Mr. W. J. Luke, of Messrs. John Brown & Co., Limited, Clydebank, naval architect; Mr.S.J.T.Thearle, D.Sc., Chief Ship Surveyor of Lloyd's Register of British and Foreign Shipping; Mr. J. J. Welch, M.Sc., Professor of Naval Architecture, Armstrong College, Newcastle-on-Tyne. The secretary to the committee is Mr. Walter Carter of the Board of Trade, 7 Whitehall Gardens, London, S.W., to whom any communications relating to the work of the committee may be addressed.



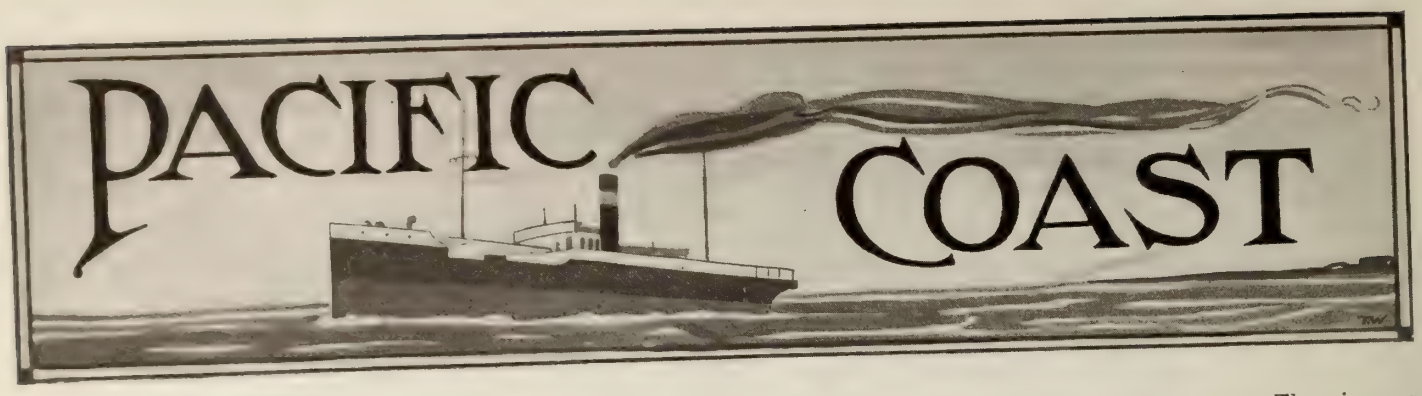
ARCHIBALD DENNY, LL.D.,
Chairman of Committee on Bulkheads and Watertight Compartments.

LIFEBOAT LAUNCHING DEVICE.

SIR BRYAN LEIGHTON has invented a new device for launching lifeboats, and a model of the contrivance was recently shown at the Hotel Cecil, London, Eng. The idea is to launch lifeboats from both sides of the ship by an apparatus on the watershoot system. The end of the shoot or launching way rests on a pontoon, which in the case of a ship of the dimensions of the Olympic would be 40 feet long, 8 feet deep and 10 feet wide. A ship of the size of the Olympic would carry two of these launching ways, one on either side. They are attached to the side of the ship by means of a swivel, and lowered by a crane which swings them free of the ship into the water. The passengers enter the boats on the deck. The boats are run along a set of rails to a turning table immediately at the top of the shoot, and are lowered down to the water level by means of a wire hawser. Towards the end of the shoot is a knuckle, which causes the bow of the lifeboat to have a tendency to shoot upwards on touching the water. The launching way can be placed at an angle, according to the state of the sea. It is assumed that an experienced seaman is placed in each boat, and directly he gets within a couple of boat-lengths of the water he manipulates the releasing apparatus; the boat shoots into the sea, and the rope is pulled up for another boat. A Board of Trade expert spent an hour in examining the device, and did not offer any serious objection to it. The inventor claims that it is a simple and inexpensive contrivance, and it is understood that it will be brought before the notice of the leading shipping lines.

LAKE BOAT MERGER COMPLETED.

GENERAL Manager Mr. C. J. Smith of the R. & O. fleet of steamers announces the consummation of the merger of the Niagara River Line of steamers with that of the R. & O., whose headquarters are in Montreal. This means that the oldest lines plying out of Toronto to Niagara Falls and Hamilton are now absorbed by the Eastern Co. It also means they are part of the St. Lawrence River Steamboat Co., and the Thousand Island Steamboat Co., running out of Kingston. The foundation of these interests was laid about 40 years ago when sailing vessels were used extensivley by the late Henry F. Folger, father of Mr. Benjamin W. Folger, the retiring general manager of the N. R. Line. The consolidation practically comprises the entire tourist and steamboat business on the north shore of Lake Ontario.



PACIFIC COAST LETTER.

By George Bulkeley, A.M.I., Mech. E.

With every mail comes news from Europe of Marine Diesel Engine progress, and now we have photographs of the "Selandia," marking the beginning of the long expected epoch of ocean-going vessels without smoke-stacks, whose advent was heralded in 1892 by Max Pemberton's fascinating sea tale, "The Iron Pirate"—a gas-propelled privateer warship whose speed was such that she could, and did, devastate the shipping of the Atlantic, and showed a clean pair of heels to the navies of the world until her gas engines seized up from lack of lubricating oil. In Mr. Pemberton's romance, the ironclad was propelled by internal combustion engines operating on hydrogen obtained by passing steam through an anthracite furnace, the gas so obtained being stored in holders built into the fore and after peaks and drawn, with air, into the cylinders therefrom.

The Internal Combustion Engine Outlook.

Mr. Pemberton has proved himself to be another Jules Verne as a prophet of engineering triumphs to come, and although the internal combustion engined vessel of to-day derives her power in a somewhat different manner from that suggested by the brilliant novelist, still ocean-going liners and freighters, requiring no boilers, no coaling, and no sweating stokers, are to-day accomplished facts, while the realization of an internal combustion engined warship is only a matter of months.

Although it is hardly probable that the internal combustion engine will ever absolutely supplant the steam engine for the propulsion of vessels—any more than steam has absolutey supplanted sailing craft for all purposes—still figures are stubborn and incontrovertible things, and the average shipowner is a hard man of business with his eye on the running expenses and cost of maintenance of his vessels; and, may the McAndrews swear ever so much by the shining steel and polished brass and beautiful indicator cards of their faithful marine steam engines, whose measured stroke and slow" has and is propelling warships, liners, freighters and tramps on "their lawful occasions" over the seven seas—still, if one, with the mastery of the vagarious gas engine in his head and undeniable evidence as to its thermal efficiency in his hand, appear before the hardheaded shipowner and proves his points to that business man's satisfaction, it is going to be a case of oil tanks in place of bunkers, and cast iron and cam shafts in place of the time-honored polished steel columns and Stephenson link motion.

The Oil Fuel Question.

It may appear somewhat of a diversion from Pacific Coast Marine Engineering to speak of the Diesel engine, when the available crude oils here have more than a strong suspicion of an asphaltum base. Science, however, can always find a way when it works hand in hand with financial and commercial desideratum, and when the time is ripe for the marine Diesel engine on the Pacific Ocean, a suitable fuel will be made available. In fact, right now, it is declared that the Port Moody "gas oil" is entirely free from asphalt, and is being used as fuel at the present time diluted with distillate in heavy duty slow speed marine gas engines on this coast, being gasified in an exhaust heated vaporizer and electrically ignited in the cylinders. The increasing price of all fuels has for some years led chemists and engineers to investigate the possibilities of engines which will utilize and turn into useful work a greater proportion of the calorific valve of one or other of the great fuel family than is possible in steam engine practice.

Comparison of Thermal Efficiency.

The present degree of thermal efficiency to which the Diesel engine has been brought places it in the following relation to the steam engine expressed in percentages of 100 thermal units:—

Types of Engine	Useful Work	Loss
Steam engine, non-condensing	9 p.c.	91 p.c.
Steam engine condensing and using superheated steam	15 p.c.	85 p.c.
Gas engine, suction type	20 p.c	80 p.c.
Diesel engine	33 p.c.	67 p.c.

It is worthy of note that out of the 67 per cent. loss in the Diesel engine, no less than 10 per cent. is due to friction; the frictional loss of a condensing steam engine using superheated steam being only about 3 per cent.. May we not, however, confidently anticipate a greater reduction in this 10 per cent. frictional loss in the Diesel engine, as the latter gradually has the same amount of careful refinement of detail



S.S. ORION AT WORK—OWNERS, THE PACIFIC WHALING CO., VICTORIA, B.C.

put into it that the steam engine now enjoys after its many years of constant improvement?

Semi-Diesel Engines.

The other interesting class of internal combustion marine engine for large powers is what is now popularly known as the Semi-Diesel type. These engines also operate on crude oil, but the mixture is ignited inside a hot ball-shaped chamber, which has to be primarily heated by means of a lamp before starting up, and is afterwards kept automatically at a red heat by the heat of combustion. In both Diesel and semi-Diesel engines, the fuel, being injected into the engine in its commercial state avoids delicate adjustments of any form of vaporizer or carburettor; while, in both these types of marine engines, the ignition is automatic and entirely does away with the inherent defects of an electrical ignition system, which, although admirably adapted for internal combustion engines (operating on the more volatile distillates) such as are installed in yachts and work boats up to moderate horsepowers, would be a continual source of trouble and anxiety in the case of large ocean-going vessels, where continuous engine operation from port to port is a sine qua non.

An objection to the Semi-Diesel for marine purposes in the larger horsepowers is that when running slow the sequence of mixture combustions in the ignition chamber become less rapid than when the engine is operating at full speed, and the temperature of the hot ball dropping from this cause, the engine loses in efficiency at slow speeds; whereas in the case of the Diesel engine proper, the ignition being brought about by the temperature of the air compressed in the cylinder, remains of constant efficiency at varying engine speeds. Also, in the Diesel engine proper, combustion is slow and expansion smooth and without shock; whereas in any engine in which ignition is suddenly brought about by an electrical spark or a red hot ignition chamber, combustion is more or less sudden, and takes place with a certain amount of shock, which, while it can be minimized by the introduction of water into the cylinder, becomes somewhat of a problem to overcome in the larger horsepowers.

The first turbine engined vessel in British Columbia water has now arrived in the shape of the triple-screw Denny built "Queen Alexandra," purchased by the C. P. R. Co. for a fast bi-daily run between Vancouver and Nanaimo, and rechristened the "Princess Patricia." The time is probably not so very far distant when a Diesel engined freighter from her European home port will steam (or should one say "gas") her silent way through the B. C. coast islands and bring up alongside the wharves at Vancouver; when the chief of such a one will most certainly be besieged for permits to scramble around the engine room of his stackless craft.

PORT OF VANCOUVER DRY DOCK.

PREPARATIONS are being made for entering upon the construction of the floating dry dock which the Port of Vancouver Dry Dock Company will erect on a 10-acre site at Roche Point, North Vancouver. The William Hamilton Shipbuilding Co., of Port Glasgow, Scotland, has been awarded the contract for the drydock and machinery to be used in its operation.

Commencement of construction of drydock will furnish work for between eight hundred and one thousand men and it is considered not unreasonable that ultimately the Port of Vancouver Drydock Company will spend $25,000,000 on Roche Point, where, in addition to the property already acquired, it has taken an option on ground for a shipbuilding yard, and an additional thousand feet of deep water frontage which will give it a total of two thousand feet. The intention is to build merchant ships at Roche Point, and as the Dominion Government subsidized the building of the drydock, a subsidy for the shipyard is now being sought as it will be managed in connection with the drydock. The drydock is to be so constructed that it can be enlarged from the present plans which give it a length of 659 feet and width of 35 feet . It will have a lifting capacity of 15,000 tons, which will be sufficient for the repair of any ships now in use on the Pacific ocean.

Roche Point promises soon to be the most active place in Vancouver, for, according to Mr. Douglas, vice-president and managing director, the Imperial Car, Shipbuilding & Drydock Co., also expects to commence work on its big plant for the manufacture of the Imperial sleeping car. Within a comparatively short space of time then, Roche Point will see a large force of men at work in the different industries indicated.

OWNERS SELLING SEALING SCHOONERS.

FOLLOWING the decision of the Victoria Sealing Company to dispose of its fleet of sealing schooners, which has been anchored in the upper harbor for some years past, the private owners of several of the sealers, which operated from here last season, are now advertising their vessels for sale. Four schooners, the Pescawha, Thomas F. Bayard, Lady Mine and Jessie, are on the market. These vessels are in splendid condition, the owners having kept them cleaned and painted during the winter in anticipation that they might possibly be permitted to hunt seals in the Pacific. Reid & Spencer are selling the schooners, and the prices set on them are as follows:—Pescawha, $7,000; Thomas F. Bayard, $6,000; Lady Mine, $5,200; Jessie, $4,750. All of them, with the exception of Lady Mine, have been engaged in the sealing industry for a number of years. It was at one time rumored that the owners of the vessels would combine to operate them in the fishing business, but after fully considering the matter they have decided to sell them. The Pescawha, built in Nova Scotia, is the largest of the four, and has been sealing for about three years. The Jessie is an old-timer, and has been hunting out of this port for many years, but is still safe and sound.

The other two vessels, the Lady Mine and Thomas F. Bayard, were formerly pilot boats. The Lady Mine was built over a score of years ago by the San Francisco pilotage, and carried the pilots to and from the ocean liners up to slightly over a year ago, when she was purchased by local sealing men. She only made one sealing cruise, the treaty between Russia, Japan, United States and Canada prohibiting her from remaining in that line of business any longer. The Bayard was engaged as a pilot boat in New York, and after fulfilling a long service there, she was sent around the Horn to carry the pilots from Portland. She, however, was of too deep draft to clear the bar in heavy weather, and was finally disposed of to local interests.

HUDSON BAY TERMINALS.

SEVERAL corps of Canadian engineers and surveyors are going to Port Nelson and Port Churchill, and work will continue all next winter on Hudson Bay terminals for the new railroad. In the meantime a decision will be reached by the Dominion Government as to which of these ports will be selected. Supplementary estimates provide $2,000,000 for starting the terminals, building docks, elevators, etc., so that the Government has provided sufficient money to be able to rush forward the work. It is the ambition of the Cabinet to have the Hudson Bay line ready to help move the crop in 1913. By the time the line reaches the Bay it is hoped to have everything in readiness for a steamship line running to Great Britain.

MARINE ENGINEERING of Canada

A monthly journal dealing with the progress and development of Merchant and Naval Marine Engineering, Shipbuilding, the building of Harbors and Docks, and containing a record of the latest and best practice throughout the Sea-going World.

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Vol. II JUNE, 1912 No. 6

COMMISSION INQUIRIES INTO TITANIC DISASTER.

AS in the case of less universally distressful yet equally important happenings from the economic personal and material viewpoint, the disaster to the Titanic has promptly been investigated by the Representatives of one nation interested and is now being inquired into by a Commission of the other; the latter, perhaps, the most vitally affected of the two by the tragedy. The report of the finding of the committee of the United States Senate has been tabled and made public, and while a wonderful production because of its sentimental setting. leaves much to be desired in the matter of real worth.

The Commission sitting in England will not either, we are sure, achieve results in any degree commensurate with the dignity and deportment that characterizes its deliberations, although, possibly, intended to offset, in large measure, the inquiry held on this side of the Atlantic. Irrespective of the ultimate findings of Committees or Commissions, an observant public opinion draws its own conclusions, and there the matter, for the most part, finally rests. An inquiry into the cause of a given trouble means, not so much, looking for this commodity as it does the making of it "hot" for some individual, or perchance more than one, and if a scapegoat can be located, the really important and universally valuable features are side-tracked. It is painfully apparent that innumerable scapegoats are to be found in the United States Senate Committee Report, and, realizing their non-technical fitness as its personnel might easily have done, care should have been taken that the evidence, only, secured from the various witnesses should have been presented. By adopting such a course the Committee would most certainly have been generally credited with the accomplishment of a public service and been spared the accusation of having given way to maudlin sentimentality. A plain submittal of the evidence to the Senate and its disposal by that body for analysis and suggestion to a duly constituted board of naval architects and marine experts, of each of whom the United States is not as poverty stricken as the line of procedure adopted might lead one to believe, would have redounded to the good sense of all concerned and paved the way for practical results to accrue The crazed demand for greater life boat equipment; the 'seat for everybody' appeal; the lifebelt and lifebuoy provision so that in the event of a person getting into the water, he or she may freeze, bake, broil or starve to death; the searchlight installation; the strengthening of the bow; the burial buoy and the hundred and one propositions that have been put forward, will, in due course receive their quietus and sleep as soundly as does the Titanic herself.

We look forward to continued progress and development in marine engineering, shipbuilding achievement and navigation aids with every confidence. The work is that of men who are actors, not chatterers, and if the Titanic disaster has taught us that the vessel herself should be first and foremost a lifeboat, in the very truest sense of the term, then the personal and material sacrifice, how or by whom caused will not have been in vain.

ICE IN THE ATLANTIC.

THE account given on another page of this issue of the cruise of the cable steamer "Minia" in search of bodies of Titanic victims, is full of instructive information concerning the presence and movements of ice fields and icebergs in the North Atlantic during the spring months each year. It is worthy of special note that the value of warnings transmitted from one vessel to another are open to doubt; due to the rapidity with which a reported "menace" changes in location and possibly appearance. The impression conveyed from a study of the conditions prevailing on this cruise are such as to call for the fullest display of caution and good judgment on the part of vessel commanders and navigators, and the receipt of warning messages should be an incentive to, if possible, the increase and redoubling of existing efforts to secure the safety of the ship and her living feight. A special significance also attaches to the contents of the log of the Minia, in view of the early warning received by the Titanic from her sister vessel the Baltic, on the fateful Sunday in April.

THE CANADIAN NAVY.

INCREASING pressure is being applied by partisans and opponents of the present administration in Canada, to bring to an end the policy of shirking and endeavoring to shelve the question of this Dominion's part, in either contributing to the support of the Royal Navy or in establishing a husky, protective, well armed and equipped fleet of its own as an adjunct to that of the Imperial Sea Force. It is becoming more thoroughly realized that our marine interests are extending so rapidly that dock, shipbuilding and repair equipments are not in the least commensurate with the requirements, and it is believed that the decision to build and own our own fleet would be most acceptable to our citizens generally; establishing, as it were, the nucleus of an industry which would be effective not only for war-like purposes, but for the production, protection and upkeep of our transportation and commercial interests as well. The policy of vacillation has about run its course, and the time has now arrived for definite accomplishment of something worthy and in keeping with our honor and importance as the leading Crown Colony.

Notable Personalities of Canada's Merchant Marine

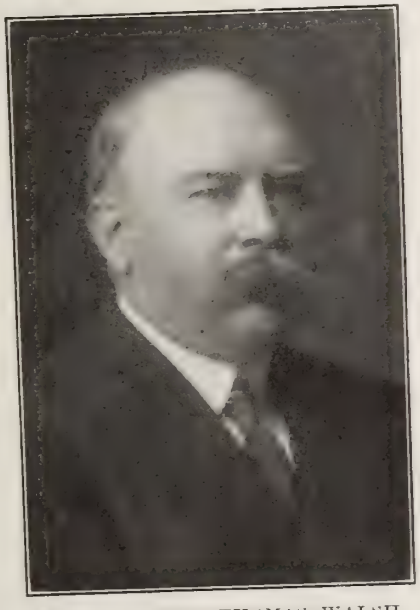
The Part That Shipbuilding, Marine Engineering and Shipping Companies Have Played in Bringing Canada Prominently Before the Eyes of the Civilized World, Has Not, We Believe, Received That Credit of Performance Which is Its Due. We Hope in This Series Dealing With "Notable Personalities of Canada's Merchant Marine," to Show That Those Who Have Bridged The Trackless Ocean to our Shores, and Provided the Facilities for Our Disembarkation, Are Worthy of at Least a Sentimental Regard.

CAPTAIN JOHN THOMAS WALSH.

JOHN THOMAS WALSH, Superintendent of the C.P.R. Atlantic Steamship Lines at Montreal, was born of Irish parentage at Chichester, England, in 1857, and was educated by the Christian Brothers. At the early age of sixteen he put to sea, and served his apprenticeship in the Calcutta trade aboard the sailing ship "First Lancashire" and other vessels. After serving as second officer of the sailing ship "Superb" in the Java trade, and as first officer on the sailing ships "Astarte" and "Primula" in the African trade, he joined the British & Africa Royal Mail Co., trading between Liverpool, West and South-west Africa, as third officer. He was quickly promoted to the ranks of second and first officer, and finally, after three years, was put in command, serving on different ships belonging to the company, and superintending the construction and fitting out of new vessels, afterwards taking command of each in turn from the builders.

In 1890 he obtained his commission as lieutenant in the Royal Naval Reserve, and in 1896, at the request of the company, took over the agency and management of their shipping business at Sierra Leone, West Africa. The following year he was made harbor master by the Governor, Sir Frederick Cardew, K.C.M.G., with a view to reorganization of the department; at the same time being appointed Justice of the Peace of the city, and Consul of the Netherlands. During the Hut-Tax Rebellion he was appointed, with the rank of major, by Sir Frederick Cardew, K.C.M.G., to raise and command a volunteer force, for which service he obtained the West African medal. After serving as agent and manager for a considerable time, he became manager of the joint agency of the African and British African Royal Mail Shipping Co. at Lagos, West Africa, and was appointed a provisional member of the Legislative Council under the Government of Sir Wm. MacGregor, K.C.M.G. While at Lagos he was mentioned in Colonel Sir J. Wilcox's dispatches for embarkation services during the Ashanti War in 1900. In February, 1902, Captain Walsh retired from the Royal Naval Reserve with the rank of commander, and returned to England to become marine superintendent of the Elder Dempster Co. When the Canadian Pacific Railway Co. absorbed this line in the following year, Captain Walsh went over with the boats, in a similar capacity.

During his comparatively short stay in Canada, Captain Walsh has made many friends, and besides being President of the Catholic Sailors' Club of Montreal, he is also a member of the Royal Colonial Institute, a Fellow of



CAPTAIN JOHN THOMAS WALSH.

the Royal Geographical Society, and a Trustee and Vice-President of the Last Post Imperial Navy and Military Contingency Fund. The major part of Captain Walsh's official government service is embodied in Colonel McLean's Royal Navy list, under the heading of War and Meritorious Service.

CANADA'S MARINE DEPARTMENT.

OUR British contemporary, "Syren and Shipping," in a recent issue says: "Whatever may be projected in Great Britain or on the Continent of Europe in the way of providing dry-dock accommodation, Canada is coming forward with all the energy of a new country to make good the want on that side of the Atlantic. It is stated that Quebec is about to construct a dry dock 1,150 feet long by 110 feet wide, with a water depth of 37 feet; at Sydney, Cape Breton, a new dock 1,000 feet by 100 feet is to be provided; St. John, New Brunswick, is to have one 900 feet in length; and on the other side of the continent Esquimault is to have a dock 900 feet by 100 feet; the largest dock there now being one of 450 feet by 65 feet at the Government Dockyard, while the largest dock on the Pacific coast is the U. S. Government dock at Mare Island, California, which is 728-752 feet by 101-110½ feet, with a depth of 31 feet 6 in. Nor is the East Coast much better off, the Government's new dock at Bremerton being the only one with width enough for the new class of liners. Montreal is also providing a floating dock 900 feet in length.

SHIPYARD AT SYDNEY, C.B.

THE result of the plebiscite as to whether Sydney would grant a bonus of $1,000,000 to the British-Canadian Shipbuilding Co., for the establishment of a plant was in the affirmative; the votes cast being 1,074 and 172 against. The company propose to spend at least $6,000,000 on the shipyard and drydock equipment.

Sir Henry Pellatt is the president of the company, which has the project in hand. Sir John Gibson, Lieutenant-Governor of Ontario, is vice-president, and the directors are Sir Charles Ellis, chairman of the John Brown Shipbuilding and Engineering Co., Clydebank, Scotland; Alexander Gracie, managing director and chairman of the Fairfield Shipbuilding Co., Glasgow. Messrs. Gracie and Ellis are also directors of the Ordnance Works of Coventry, England, which company, with those of Armstrong and Vickers, Ltd., supplies the whole of the ordnance for the British Admiralty. Mr. A. C. Ross, Sydney, is the secretary of the company.

The British and Canadian Shipbuilding Co. has secured an admirable site of three hundred acres for the shipyard and dock, immediately adjoining the works of the Dominion Iron and Steel Corporation. Ships of the biggest type both for navy and merchant service will be constructed, and eventually it is the

avowed purpose of the company to manufacture ordnance.

Mr. Grant Hugh Brown has been in Sydney looking the ground over, and he stated that it will be the company's policy in every way to help further build up the Dominion Steel Co. As a matter of fact it is the cheapness of steel and coal which has attracted the Shipbuilding Company to Sydney. This advantage, it is claimed, will at least counterbalance the extra cost of labor as compared with the wages in England and Scotland, and thus put the company on an equal footing to compete with the shipbuilding firms of the Old Country.

Ship plates, angle bends, and in fact every bit of steel used in the construction of a ship will be purchased from the Steel Company, and with these two great industrial agents working alongside one another and in unison, much, it is submitted, will be accomplished for the industrial progress of Sydney and the Dominion.

THE OIL-ENGINED SHIP "JUTLANDIA."

THE oil-engined ship Jutlandia, the first British-built passenger sea-going vessel fitted with Diesel oil- engines to be completed, recently concluded her trials. She is 370 feet in length between perpendiculars, 53 feet broad, and 30 feet moulded depth, and has been built and engined by Barclay, Curle & Co., Whiteinch, Glasgow, for the East Asiatic Company. The Jutlandia is a sister-ship to the Selandia, built by Burmeister & Wain, of Copenhagen, particulars and an illustration of which were given in our April issue.

Machinery Features.

The Jutlandia's propelling machinery consists of two oil engines of the Burmeister & Wain Diesel type, designed to work on the four-cycle principle. She has twin-screws, each shaft being driven by eight cylinders of 20.87 in. diameter by 28.74 inch stroke. The main engines of the two ships are exactly similar, the only points of difference in the installation being found in the method of driving, the disposition of the auxiliaries, and the pipe arrangement. The Selandia has two pumps driven by compressed air, whereas, in the Jutlandia, all the pumps are electrically driven, with the exception of the stand-by steam-driven compressor. The auxiliaries have been so disposed that the space between the two main engines is entirely clear of pumps. On the main engines, a pointer is provided to show the direction of rotation, so that when this pointer coincides with another, marking the setting of the camshaft, fuel oil may be turned on.

The vessel's steering gear is of the Hele-Shaw-Martineau type, of which Messrs. John Hastie & Co., Greenock, are the sole licensees, while a telemotor has been supplied by Messrs. MacTaggart, Scott & Co., Ltd. The donkey boiler, which supplies steam for heating and for the auxiliary compressor, stands between the thrust-blocks. Leakage of fuel oil from the burners of the boiler is caught in a scupper formed by a caulked angle iron.

Speed and Power Trials.

At the trials a speed of 12 knots was maintained for some hours, the main engine developing nearly 2,800 indicated horsepower, with a consumption of fuel oil at the rate of 10 tons for 24 hours running. The latter figure includes the fuel oil required by the auxiliary Diesel engines to generate the current for working the auxiliaries of the main engines. This consumption works out at 0.4 lbs. per brake horsepower per hour (assuming a mechanical efficiency of 84 percent.), a remarkably good result. The oil used was Scotch shale oil, of a specific gravity of 0.855, but in ordinary service the engine will use the heavier oils obtained at Bangkok. The change from full ahead to full astern was made during the trials in 12 seconds.

Every credit must be given to Messrs. Barclay, Curle & Co., for being the first to complete successfully an installation of the importance of that of the Jutlandia, which has a gross tonnage of 5,300 tons and a carrying capacity of 7,400 tons, the result being obtained without departing in any way from well proven principles. At the same time it is realized that the marine Desel engine of the near future will work on the two-stroke-cycle principle, thereby enhancing greatly the advantages at sea of this type motor. The Jutlandia, it may be added, is classed with the British Corporation for the Survey and Registry of Shipping.

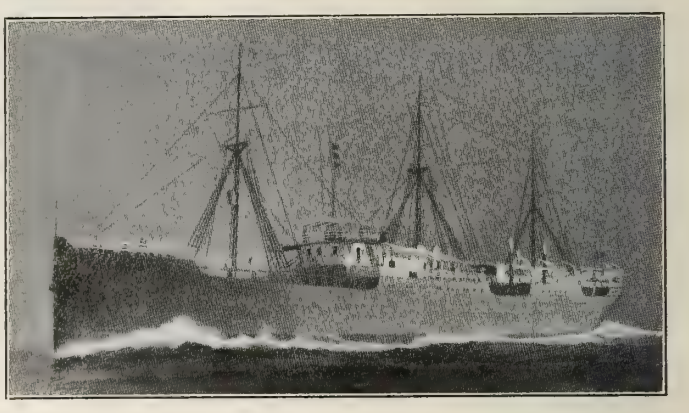
THE OIL ENGINE PROPELLED FREIGHTER "TOILER."

THE first trip made this season by the oil-engined grain vessel Toiler proved disastrous, the boat going ashore on Fraser's shoal just below Cardinal, near Kingston. The current being very strong at this point, it is presumed that she took a shear and grounded before the pilot was able to bring her back to the channel. The Toiler was carrying grain from Port Colborne to Montreal when the accident occurred. She was afterwards floated and proceeded on her voyage.

This season the Toiler has been so equipped as to be better adapted to Canadian climatic conditions, only the main engines being oil driven. A Cochrane oil fired boiler has been installed, the Wallsend-Howden method of forced draught and oil firing being used. In this system, the oil is in gaseous form by the time it reaches the nozzle. The air compressor which was used for driving the auxiliary machinery has been removed; likewise the paraffin motor and generator used for lighting. A Clarke-Chapman mooring winch, capstan, windlass and new steering gear, all steam driven, have replaced the compressed air apparatus. The living quarters of the crew are also steam-heated and the hold has been divided by wooden bulkheads so as to carry more than one kind of grain.



ENGINES OF THE "JUTLANDIA."



MOTOR LINER "JUTLANDIA."

CANADA'S WELCOME TO NAVIGATION CONGRESS DELEGATES.

MAJOR G. W. STEPHENS, in addressing the International Congress of Navigation delegates, in Montreal, said:

"We welcome here to-night perhaps the most distinguished group of foreign visitors that has ever done us the honor of coming into our midst; gentlemen from the four corners of the earth—descendants of those who through all ages have been torchbearers of civilization.

We welcome you to Canada's chief city, the commercial capital of a young country, the second seaport in America. You have come to us by a circuitous route, through that great back door of Canada the portals of which stretch for 3,000 miles between two peoples, unmarred by the frown of fortress or battery, where the voice of the sentry is still, where the doors are always open; the keys having been lost in a hundred years of harmony and mutual respect.

Called together as delegates to the 12th Congress of Navigation in the City of Philadelphia, you have been received in the cradle of democracy with royal splendor, you have tasted deeply of a hospitality that is prodigal and you have stood in amazement, no doubt, at the stupendous industrial profligacy of a nation that has gathered to herself one hundred millions of people in a single century.

Leaving the brilliancy of this achievement in the background you have come to a younger and more modest country; where abides the eldest daughter of the British Empire—Canada, occupying as she does the northern half of this continent—slightly the larger half be it not forgotten—though possessing as yet less than one-tenth of the population of her big brother the United States. What have you seen in Canada and what are your impressions?

Glimpses of Canada.

You have seen here in Canada the descendants of two great peoples—living happily side by side, emulated by an unselfish and generous rivalry, who nevertheless have shown to the world that the path of ambition has not become so narraw that two cannot walk it abreast. You have briefly examined our great inland navigation system which with the St. Lawrence River, Canals and Great Lakes, give us the deepest and largest water routes in North America. You have, perhaps, remarked that this great water system put across the map of Europe would reach the Ural Mountains in Asia; give it to South Africa and it will cut in two that continent at the Equator, joining together the Atlantic and India Oceans; give it to South America and it will rival the great Amazon, stretching from British Guiana to Buenos Ayres; give it to the United States and it will stretch from New York to Salt Lake City.

You have examined our railway system and found out that Canada is the only country in North America which possesses a Transcontinental Railway spanning the Continent, owned and directed by a single management; you have found out further that two more Transcontinental Railways are in progress, so that by 1915 when the great Panama Canal opens its gates, Canada will have three Transcontinental Railways feeding the seaports of both oceans.

You have been interested in the Port of Montreal, one of Canada's National sea terminals, the furthest inland sea port in the world, with 1,000 miles of river leading to the ocean on one side of her, and 1,250 miles of inland navigation leading to the heart of a continent on the other side. The Port of Montreal is owned by the people of Canada, financed from the National Treasury and administered by three national trustees appointed by the Federal Government. This is one of the few examples of Public Ownership in North America where usually the good things are found out by the corporations and trusts before the people have awakened to the realization of their value. For 16 miles on either side of the river, this jurisdiction extends and this port is approached by a buoyed and lighted channel, the minimum low water depth of which is 30 ft.; soon to be dredged to 35 ft. There is no tide, and ships of 15,000 tons dock day or night.

You have seen at work in the Port of Montreal the largest transfer elevator system for grain, yet assembled at any one point, with its grain storing capacity of 5,000,000 bushels and its landing capacity of 2,000,000 bushels per day, carrying the golden grain from the central storehouses to each ship at her own berth. You have seen a sea port, to whose docks and piers, cars of every railway in the country have easy access, where the cargoes are landed and unloaded without the use of expensive machinery; a port where no tonnage dues are charged against the ship, where the revenues are secured by moderate rentals for space occupied and rates on goods passing to and fro over the wharves. Yet this infant port, just starting, is doing a volume of business exceeding that of any other port in North America, except New York. In your brief visit to this country you have no doubt seen enough to create the impression that at any rate Canadians are heirs to a great legacy; a country of vast dimensions, natural wealth and wonderful resources, enough perhaps to turn the head of many an older country. Nature has made this a country of big things, our rivers, mountains, mines, forests, agriculture, commerce, our outlook, our language, our hopes, all show signs of being planned in keeping with the dimensions of a big country with a big future. While this is true, let me assure you that we are not forgetful of what the older countries have done for the advancement of the world, and how much we owe to them for what we have and enjoy.

Canada's Indebtedness.

What Great Britain has done in the cause of commerce and navigation; what the imaginative genius of France has achieved in engineering, architecture and art; what Germany has done in the construction of newer and higher standards of organization and investigation; what Italy has done through her great artistic and inventive minds; what Russia has done for constructive engineering; what Norway, Sweden and Denmark have accomplished; what Switzerland has modelled for the world in her exemplary government, all these things we remember. We want you, therefore to feel that you have come in contact with a young, vigorous and determined people sprung from the lions of the foremost nations in the world, who, while proud of their inheritance are mindful of what they owe to the older countries from which you come, to their forefathers who ploughed the way and held the beacons high in days when hardship, poverty and privation were constant companions.

Nous sommes heureux de rendre hommage a la vielle France, dont M. Gabriel Hanoteaux a si gracieusement parle l'autre jour pendant sa visite.

Il nous a dit entre autre choses que la France etait riche parce qu'elle a decouvert le secret "des petits tonnages et des benefices."

Permettez-moi de vous dire que la France est riche, parce que dans le coeur de ses citoyens se trouve l'amour de leur patrie; et nous, Canadiens, le serons autant si le meme sentiment existe dans nos coeurs.

Das ist mir eine besondere Vergnugung den aus dem Vaterlande herkommenden Deutschen ein herzlich Wilkommen auszusprechen.

Vor einige Jahren habe ich die Ehre gehabt welche Monate in Deutschland zu wohnen.

Da habe ich ein Bischen Deutsch gelernt, und auch die Sprache der bruderlicher Liebe, die ich nie vergessen habe, als mitglied der Scharaffie bin ich noch Knappe neun und sechzig, und sage mit euch "wir Deutschen furchten Gott, aber sonst nichts auf der Welt."

Canadians realize that the future of their young country, honored this day,

by the visit of so many distinguished men, depends not in her mines, not in her forests, not in her wheat fields, but in the hearts and minds of her people, the integrity of her men and women, who say,—"We Canadians fear God but nobody else in the world."

I am quite sure that our old world guests, who to-night delight us with their presence, will never cease to be proud of the fact that the great names of which they are the honored representatives are inscribed upon some of the most splendid pages of the New World's history, and will live forever in the grateful affection of the New World's heart.

PARS FROM CURRENT LITERATURE.

Those who urge the construction of the projected Georgian Bay Canal should make a note of the fact that the proposed new Allan steamers, according to a representative of the firm, may not be able to come up the St. Lawrence to Montreal, though the channel has been undergoing betterment for more than half a century.

The opening of the Panama Canal will reduce the ocean voyage from Britain to Vancouver or Victoria about 6,200 miles, and from Montreal to Sydney, Australia, 2,700 miles. Many of the trade routes of the world will be changed out of all recognition by the use of the canal. Few and far between will be the vessels that will "round the Horn" a decade hence.

London's Lord Mayor announces that there is so much money pouring in for the Titanic fund that he does not know what to do with the surplus. Part of it might well be used in purchasing a course in some marine correspondence school for Senator Smith, chairman of the Senate committee that conducted the American investigation.

HOT SHOT.

THE Syren & Shipping of June 5, has the following, among other comments to make on the Report by the United States Senate Committee and speech accompanying same by the Chairman, Senator Smith:—"There is, of course, a possibility that the American Government may act upon some of the recommendations made therein, but it is, we think, a rather remote one. Our friends across the Atlantic have a knack of being wildly excited over a matter at one moment and forgetting all about it at the next; and we do not believe that any thing in the shape of legislation will follow upon the report.

"As for that production itself, it is just the sort of thing that one would expect from a body of men who knew nothing of the subject with which they were dealing. Some of the conclusions are reasonable enough, but that is simply because they refer to questions upon which any ordinarily rational being could arrive at a conclusion. For example, the committee state that 'had there been much sea, it is questionable whether any boats would have reached the water without being damaged or destroyed.' Any schoolboy, we opine, must be able to see that the launching of boats from a height of 75 feet in a heavy sea is likely to lead to damage. Again, we are told that 'the Titanic virtually ignored the ice warnings.' It did not need much perspicacity to arrive at this 'conclusion.'

"In other directions, however, the committee display ignorance coupled with prejudice. They suggest, for example, that there was a lack of proper discipline aboard the Titanic. The charge is an absurd one, as everyone acquainted with the working of our big passenger lines will be well aware. However, we will not pursue the subject of the report any further. It is with the speech with which Senator Smith supplemented it in the Senate that the main interest lies.

"If that gentleman had been bent on showing his hopeless unfitness to preside over a deliberate body such as the Titanic Committee he could not have achieved his end more effectually. The greater part of his oration was nothing but pure rant, while here and there he dropped in a falsehood, like a rotten plum in a pudding made of bad flour. It is satisfactory, though, to learn that he intends to 'leave to the honest judgment of England its painstaking chastisement of the British Board of Trade, to whose laxity of regulation and hasty inspection the world is largely indebted for this awful fatality.' We do not altogether admire the conduct of the Board of Trade ourselves, but we certainly agree that it was better to leave the chastisement of that Department to be dealt with by the nation to which it belongs. Had Senator Smith decided to perform the operation himself he might have brought about international complications."

Commenting on that part of the report which suggests that all ships carry buoys with which to mark temporarily the ship's place of burial in case of accident, it is pertinently asked: "What does the man mean by saying that ships should carry buoys to mark the place of their burial in case of accident? Surely he cannot be quite sane! The Titanic, we believe, sank in about two miles of water. Does Senator Smith believe that buoys are stuck down to the surface of the sea with glue?

NEW NAVAL DRY DOCK AT NEW YORK.

AFTER many vicissitudes, the new dry dock in the Brooklyn Navy Yard has been completed and formally opened by the docking of the U.S. battleship Utah. As long ago as June, 1900, Congress voted a million dollars for the construction of a dock 554 feet long, and capable of taking in a vessel of 91 feet beam. The contractor encountered shifting sand in such quantity that he finally abandoned the work. In April, 1908, another contract was entered into, and the length of the dock was increased to 620 feet. The same trouble was met with, and the contract was cancelled in October, 1909. No time was, however, lost after this, for six weeks later, another firm—the Holbrook, Cabot, & Rollins Corporation—was entrusted with the work, and the final dimensions decided upon were 726 feet long and 110 feet wide. Acting in conjunction with Mr. Frederic R. Harris, civil engineer of the United States Navy, who devised the plan of construction finally adopted, this firm was successful in overcoming the difficulties which had rendered the first two attempts ineffectual.

The subsoil at the site of the dock is largely underlaid with exceedingly treacherous quicksand. This in places goes down to a great depth. The least depth at which rock was found was 95 feet. This was at the head of the dock. At the entrance the rock was not encountered up to 150 feet. However, between 85 feet and 95 feet below the surface a coarser sand and some gravel were met, and this allowed of Mr. Harris's plan being put into operation. His idea was to have three lines of piers 7 feet square, with flared fotings 11 feet square, sunk by compressed air methods either to bed rock or to the hardest foundation obtainable. One line of piers was on the centre line of the dock and one line on each side. The piers were spaced 20 feet centre to centre longitudinally and 24 feet centre to centre transversely. The floor of the dock, which was of reinforced concrete 8 feet thick, was built on the tops of these piers. A cut-off wall reinforced with 60 lb. rails sunk under compressed air surrounds the whole dock, except, of course, at the entrance. The work has apparently been entirely successful, and reflects great credit not only on the proposer of the idea, but on the contractors who so ably carried it out.

Addressing the International Navigation Congress tourists at Kingston, Saturday, Hon. Mr. White, Canadian Minister of Finance, said it was proposed to furnish funds to make Canada a great highway for the world's trade from east to west, to deepen waterways and to equip ports.

READERS' NOTES AND VIEWPOINT

Devoted to Brief Article Contributions Covering Experiences, Correspondence and Comment on Matters Marine. We Pay for Suitable Material.

THE TITANIC DISASTER.

By R. McCleery.

IN Senator Smith's report on the Titanic disaster, the writer was amazed to read of the suggestion regarding "longitudinal watertight bulkheads."

The "inner watertight skin" referred to, undoubtedly means a fore and aft bulkhead on both port and starboard sides, and in view of the suggestion, which he would have adopted as a rule, what means does he recommend in the event of the outer shell being punctured, as was that of the Titanic, for an estimated distance of some 200 feet, to prevent the transverse metacentre distance from centre of gravity—or metacentric height, from altering? Such a contingency would be due to the centre of buoyancy having moved from the middle line to that side which was punctured; the athwartship trim, being so altered that it would be impracticable for a skipper to beach his vessel, even if he had the opportunity.

In looking back over past shipbuilding records, it is particularly noticeable that the "longitudinal bulkhead," largely in vogue some 15 to twenty years ago, was soon regarded as the most dangerous feature of a ship's equipment in the event of a collision on either port or starboard sides, for the reason already stated that the vessel would lose her trim, roll over and sink. By way of explanation of my point, let us assume that the Titanic had fore and aft as well as her 15 transverse bulkheads. With her starboard side ripped open, say 200 feet, representing 4 compartments flooded, a displacement of from 6,000 to 7,000 tons would be lost. Under such circumstances, with the entire load on this damaged side, the result would have been that instead of her keeping afloat for two hours, due mostly to the heroic devotion of the engineers in their manipulation of the bilge and auxiliary pumps in the engine room and stokeholds, she would have rolled quickly over, leaving little opportunity to launch even one lifeboat, although there had been enough of them to accommodate every soul on board. The total loss of H.M.S. Victoria was caused by a fore and aft bulkhead in this manner, for after being rammed amidships, the vessel rolled over and sank almost immediately. An inner watertight skin is equally dangerous for the like reason.

In view of the above known facts the writer has no hesitation in coming to the conclusion that naval architects will work and design from experience and data and not from "fads" or "fancies."

Questions and Answers

By Calliope

1—Q. Explain the expressions "saturated" and "superheated," as applied to steam?

A. Saturated steam is moist, and has a temperature according to that of the water from which it has been evaporated and to its pressure. Superheated steam is saturated steam dried and raised in temperature in a vessel distinct and separate from that containing the water of evaporation. Its temperature is always more or less in excess of that corresponding to its pressure.

* * *

2—Q. To what strain is the shell of a steam boiler subject?

A. To a tensile or tearing apart strain in the girth direction of the plate. For this reason we use the ultimate tensile strength of the material in calculating the working pressure permissible.

* * *

3—Q. If you were specifying the steel for boiler shell plates, what qualification would you make in respect to thickness and quality?

A. That each be uniform, providing equal wear and strength throughout.

* * *

4—Q. Is the shell of a boiler equally strong longitudinally and circumferentially?

A. No, it is twice as strong in the latter direction as it is in the former.

* * *

5—Q. In a new, well designed, well constructed boiler, where is the shell weakest?

A. Along the riveted joint, due to the rivet holes.

* * *

6—Q. Why is a butt joint preferable to a lap joint in a steam boiler?

A. Because it avoids offsetting the plate ends, keeps the shell in a true circle, and gives a stronger joint.

* * *

7—Q. What is the objection to welding the longitudinal joints of a boiler shell?

A. No guarantee can be had of the reliability of a weld. The pressure, being internal and bursting, would tend to aggravate any imperfection, and open the weld, causing an explosion.

* * *

8—Q. What is the difference between a tube and a pipe?

A. A tube is indicative of surface, a pipe of area. Example: A 3-inch tube will measure 3-inch outside diam., while a 3-inch pipe will measure 3-inch inside diam.

* * *

9—Q. Are two 4-inch pipes equal in area to one 8-inch pipe?

A. No, the 8-inch pipe has an area double that of two 4-inch pipes. Doubling the diameter therefore increases the area fourfold.

* * *

10—Q. When are small smoke tubes 1¼ and 1½ inch diam. used in boilers?

A. Under forced draft conditions, on account of the rapidity with which the gases pass through the tubes and the necessity of their being in contact with the tube surface all the time. With ordinary natural draft-sized tubes the gases would simply take a central course with little or no surface contact.

* * *

11—Q. What is lead?

A. Lead is the amount of steam port opening at the commencement of each piston stroke.

* * *

12—Q. What is lap?

A. Lap is the amount the valve covers the ports at each end of the valve face, when it is in middle position.

* * *

13—Q. Should a valve in its travel open a full port to live steam?

A. No. Because the ports are designed so as to allow of a free escape of exhaust steam, and if a full port is given or is necessary for live steam, then for exhaust the port is not large enough.

* * *

14—Q. Why is it necessary to have a larger area of port for the exhaust, as compared with the live steam?

A. Because the live steam having done its work in the cylinder has fallen in pressure, becoming naturally of greater volume, requires a larger space or area for escape.

* * *

15—Q. What is Boyle's Law?

A. Boyle's Law defines a perfect gas as having a constant pressure volume.

$$pv = \text{constant.}$$

Example—Steam at 100 pounds pressure in a vessel of 10 cubic feet capacity.

$$100 \times 10 = 1000$$

If we pass that steam into another vessel which is 20 cubic feet capacity, the pressure will fall to 50 pounds, thus:

$$\frac{1,000}{20} = 50 \text{ pounds}$$

showing that the constant value remains the same. It is this volume increase that calls for ports and exhaust pipes being larger in area than live steam admission openings and live steam pipes, the pressure being lower.

TO COMPUTE STEAM CONSUMPTION FROM INDICATOR DIAGRAMS.

By Joseph W. Hayward, M.Sc.

THE simple method of estimating the steam consumption of an engine from indicator diagrams given below, though rough and ready, is of considerable use. At least the present writer has found it so, and he knows of an instance in which its application led to the discovery of serious leakage past the high pressure valve of a compound engine. This computation gives the quantity of steam actually being used in each cylinder of an engine, and upon each side of the piston. To get the corresponding boiler feed, an allowance of about 10 per cent. must be added to the figures obtained to allow for condensation in steam pipes and engine. In other words, should the boiler feed exceed the diagram computation by much more than ten per cent., something is wrong, and a leakage should be sought for. Again, in a compound engine, if more steam appears in the low pressure than in the high pressure cylinder, there must be a leakage past the high pressure valve or piston, and if there is more in the high than the low, the leak must be upon the low pressure side.

Necessary Data and Constructional Detail.

The necessary data for the computation are a pair of indicator diagrams from the "head" and "crank" ends of the cylinder, and the following notation of other particulars:—

A. = area of piston in square feet.
a = area of piston rod in square feet.
L = stroke of piston in feet.
N = revolutions per minute.

Draw lines across the diagrams corresponding to any convenient pressure (p), and cutting both the expansion and compression curves. The lengths of these lines (x) and (y) represent the volumes of steam used and discharged while the diagrams were being drawn, upon the same scale of which (l), the length of diagram, represents the volume swept out by the piston; (i.e. AL for the head end, and (A—a) L for the crank end.) This volume of steam is the difference between the total volume in the cylinder during expansion and the volume retained during compression, both measured at the particular pressure (p).

It follows that the volume of steam discharged per revolution, measured at pressure (p) is

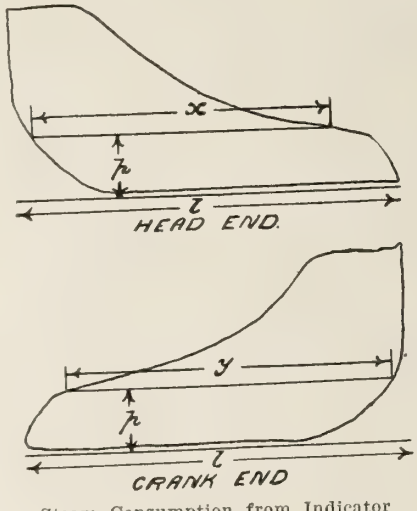
$\frac{x}{l}$ AL cubic feet for the head end,

and $\frac{y}{l}$ (A — a) l cubic feet for the crank end.

The total volume discharged per revolution is, therefore:

$$\frac{x}{l} AL + \frac{y}{l} (A - a) L = \frac{L}{l} [xA + y (A - a)],$$

and the consumption per hour is $\frac{60 NL}{l}$ [xA + y (A — a)] cubic feet. The volume (V) of one pound of saturated



Steam Consumption from Indicator Diagrams.

steam at pressure (p) may be found by reference to a set of steam tables.

The weight of steam consumed per hour by the engine is the volume at pressure (p) found above, divided by (V),

and $= \frac{60 NL}{Vl} [xA + y (A - a)]$ pounds per hour.

Example.

The diagrams given are from a 12 by 16-inch engine (with a 3-inch piston rod), making 180 revolutions per minute.

$L = \frac{4}{3}$ feet.
A = .785 square feet.
a = .049 square feet.
N = 180.
L = 3 inches.
x = 2.3 inches.
y = 2.5 inches.
p = 30 lbs. per square inch above atmosphere = 45 lbs. absolute, approximately. Therefore, V = 9.287 cubic feet.

$$\frac{60 NL}{VL} [xA + y (A - a)] =$$

$$\frac{60 \times 180 \times 4}{9.287 \times 3 \times 3} [2.3 \times .785 + 2.5 \times .736]$$

= 1884 lbs. per hour, and adding 10 per cent., this becomes 2,072 lbs.

The horsepower of the engine, deduced from the indicator diagrams is 75, therefore this computation shows the feed water consumption to be approximately 27.6 lbs. per horsepower-hour.

BREAKDOWN EXPERIENCES.

AT a recent meeting of the Junior Institution of Engineers a short paper on "Breakdown Experiences" was read by Mr. G. L. Morty. In the course of his remarks Mr. Morty said that when journeying from Buenos Ayres to Liverpool on the SS. Urmston Grange, the bottom of the circulating pump dropped out, being eaten away by corrosion. It was first repaired by cutting a hatch cover to the diameter of the barrel, and fixing with cement mixed with sea water but the repair only lasted a few minutes. After chipping out the cement, the pump was again repaired, the cover and cement being mixed with pitch and tar to make the cement elastic. This equipment only lasted about six hours. By putting plates on top and bottom of the wooden cover, with red lead between the wood and cast iron, and bolting the lot together, a satisfactory job was made which lasted the remainder of the voyage.

On another occasion (while on the SS. Nile) the Worthington pump valve-chest fractured in several places. This was, in the first place, patched up with butterfly patches, but, being found unsatisfactory, a wooden box was built around the whole chest and filled with cement.

On the same steamship the h.p. double-ported slide valve broke. On examining the valve the top bar was found to be missing, and a big part of the body of the valve. A repair was made by fitting an angle iron for the top bar and fitting a piece of plate from the angle iron to the body of the valve, covering the place which was broken. This lasted for

some time, but broke again, so the valve was taken out and the engine worked compound to Buenos Ayres. At that port some gun-metal castings were made for the top, bottom and exhaust bars, also for some of the bars on the cylinder face. These were fitted, chipped and filed flush, making so satisfactory a job that we were able to go ahead full speed. After the first break of the l.p. valve, the eccentric, or intermediate crank-shaft, was examined. When the eccentric was taken off, it was found that the crank-shaft had a bad fracture in the fillet next to the coupling. This shaft was taken out, and a new one fitted, and a keyway cut for the intermediate and l.p. eccentric.

The crank-shaft of a fan on another steamship fractured through the crank. Repair was made by welding a ring and shrinking it onto the crank, then boring and tapping a few ½-inch holes, screwing in studs and riveting them over.

A main steam pipe that had fractured in the fillet close to the flange was repaired by taking out the gland ring, which was in two halves, and fitting it over the fracture. The joint was made with red lead, and the gland fitted over and held to flange by six long bolts; the whole finally being clipped over with a band made in two halves. The arrangement was so satisfactory, that the boat steamed home on full pressure.

The joint between an air pump and condenser gave out on another steamship. As there was no time to take to pieces and rejoint, repair was accomplished by making patches to fit inside, covering joint, drilling and tapping about three dozen holes, and making red lead joint under patches and bolting down.

A refrigerating plant, which was frozen up by some foreign matter getting in the circuit, was cleared by first of all taking out the two discharge valves on the compressor and pouring in about a pint of methylated spirit, boxing up, and running machine slowly to pump spirit through system. This was repeated a few times—a quart of spirit on each occasion till the whole system was thoroughly clear.

ENGINEERS' STATIONS ON A LINER.

MR. F. J. BLAKE, R.N.R., superintendent engineer of the White Star Line at Southampton, made the following statement recently as to the duties and stations allotted to the engineers on board a liner in the case of an accident, which we report below:—

When a ship leaves port a complete boat list is made up, which list is pinned up in the room of every watch in the ship, and also on a notice board in the engineer's quarters. In the case of an ordinary collision, in which probably the engineers would have an opportunity of getting away, they are directed to take charge of boats, but in a case like the disaster to the Titanic, all the engineers would be required below to endeavor to stop any leak that might take place in the water-tight bulkheads, and perhaps to take steps to support the bulkheads. All the pumps would be working to their utmost capacity ,and the electrical engineers would be keeping their dynamos running as long as possible. The emergency dynamo would be kept running as long as there was steam to supply it.

When this accident happened and the telegraph rang from the bridge either to stop or reverse the engines, a call bell would be rung from the engine room to the engineers' quarters intimating that all engineers were wanted below. At sea and at such a time this would at once be recognized by the "watch off" as being an emergency call, and they would be down below in a few minutes. They would be then under the direct orders of the chief engineer, who would depute the engineers to different duties necessitated by the exceptional circumstances, and at such duties these men would remain until ordered out of the engine room by the chief engineer. They would be working surrounded by miles of live steam pipes, and they would be superintending or assisting in drawing out fires or doing other work where everything was under pressure of steam of 200 lb. The engineers of the Titanic were the pick of the service. They were second to none and were chosen from the finest boats in the company's fleet on account of their excellent record. There can be no doubt that it was entirely due to the heroic devotion of these engineer officers that the ship remained afloat as long as she did.

CRUISE OF THE CABLE SHIP MINIA.

THE following interesting account given by Capt. W. G. S. de Carteret, F. R. Met. Soc., and F. R. S. A., of the Western Union Cable Ship Minia (British), is here reproduced. With the exception of the blue print, showing the position of the recovered bodies and the northern limit of the Gulf Stream, the report is complete as here given:

"I met the Cable Ship Mackay-Bennett in about lat. 41 deg. 33 min. N., lon. 49 deg. 25 min. W. She reported having cleaned up the western edge of the drift. This position was about S. 72 deg. E., 40 miles from the position given for the Titanic. After making allowance for possible wind drift and taking the direction of the drift of wreckage on a smooth day, it appears that the actual drift was S. 60 deg. E. (true), but as I found bodies over 50 miles east (true) from the above position, and since my return to port, have seen that bodies were passed about S. 25 deg. E. (true) 20 miles also from that position, it makes the direction of the stream somewhat uncertain, but it shows that the bodies did not travel in the same direction nor at the same rate.

Iceberg Data.

During the search, a large berg, 70 feet high, was passed close-to in lat. 41 deg. 50 min. N., lon. 49 deg. 15 min. W., and a few days after, this berg was again seen in lat. 42 deg. 50 min. N., lon. 49 deg. 07 min. W. I supposed it to be the same berg, as it was of a peculiar shape not often encountered. It resembled a giant lying on his back with legs wide apart, headless, with legs stretched out about 200 feet long, the toes pointing upward about 25 feet, from the ankle to the knee submerged, and the seas washing up the fork. This was the view from the east. From the west it looked like a lean-to shack, with lines criss-crossing all over its west side, resembling sled or ski tracks; that portion had not been awash, as it still had snow on it. If I am correct in supposing it to have been the same berg, it shows that at times a current or strong wind may set icebergs to the north. I may say that 70 miles east of Cape Race I have seen bergs go past an anchored buoy, traveling north (true) at 1 mile an hour against a light north wind. Although, therefore, information given to a captain regarding positions of bergs may put him on his guard, it is extremely unlikely that he would find them in the same spot twenty-four hours after; and any action taken by him to keep clear of that spot would as likely as not lead him on the berg he was trying to avoid. The berg I have described seems to have gone north at the rate of 15 miles a day, which is not an unusual rate for a berg to travel.

In my cable work during the early months of the year, between January 15 and March 31, East and N.E. of Newfoundland, I have had to force a passage through heavy Arctic field ice for over 150 miles, and on two or three occasions have actually repaired a cable in a large lake of clear water, with heavy ice all around the horizon, which closed in just as the repair was completed. It has been necessary to attach hawsers to icebergs, and tow or cant them so they would not ground on a cable and crush it, and I have known them to ground on the Banks of Newfoundland in 42 fathoms and crush a cable; but I have never known them to remain in or near the same spot for even twelve hours, unless they were near the shore or rocks

or shoals. It is apparent, then, that positions of icebergs given to a captain are merely in the nature of a warning that they are around.

The Gulf Stream.

It may interest you to know where the northern limit of the Gulf Stream was on April 30. I had followed wreckage from lat. 41 deg. 30 min. N., lon. 48 deg. 40 min. W., eastward, picking up two bodies in about lon. 48 deg. 15 min. W., when I saw a wall of fog to leeward in a S.E. direction. I realized it was caused by the Gulf Stream and decided to examine its border for bodies and wreckage. There was a short, heavy sea, which caused the ship to plunge bow under when at half speed, and a lot of wreckage trending S. 60 deg. (true), in the cold water and N. 65 deg. E. in the warm. As the ship's bow was about to enter the fog the sea temperature was 35 deg., and as her stern entered it the temperature was 56 deg. The fog being too dense to see anything, I returned to the cold water and repeated the tests with the same results. It was clear to the N.W. of the stream. The color of the cold water was a greyish blue, and in the stream a purple blue. The change in direction of the wreckage was quite marked as it was caught in the waters of the stream, and I found that with a South or S.E. wind there was little or no fog, but the cold North or N.W. winds brought down the fog at once.

Temperatures Near Icebergs.

Temperatures taken in the vicinity of icebergs showed no difference from those taken in other parts of the same currents. I also noticed that the streams are not running in a straight line side by side, as bays of varying widths and depths are found in which the waters of one current run into those of the other, and it might so happen that a captain taking the temperature of the sea might judge that he was near field ice, because it was lower than he had it a short time before, or, being higher, conclude that all danger of ice was passed; yet in both cases he is liable to be wrong, as bergs are seen in both cold and warm waters. He may run a hundred miles in cold water and not see a single berg. Running to Halifax, I passed through several bays of warm water running into the cold, a change taking place in less than half an hour, yet no icebergs were in sight nor field ice near.

If heavy masses of field ice were to leeward of a ship, it is possible a decided change in the temperature would be noted, as the passage of the mass might leave a cold wake behind it, or if a current moved faster than the rate at which the mass was moving, then to leeward of it cold water might be found. The whole thing is so uncertain, however, that no captain would be justified in making any alteration in his course from the changes in temperature only.

All bodies recovered in the cold water were frozen and had to be thawed in the sun before embalming; but one found on the edge of the stream was soft, and decomposition had set in. No field ice was seen, no soundings taken, and no buoys anchored. On April 24 I passed a large bell buoy in lat. 42 deg. 56 min. N., lon. 57 deg. 18 min. W., with white and black bell supports, body red and white, four swinging hammers; rivets on manhole cover appeared to form the letters C. K. D. Observations were scarce, being obtainable only on two days of the week that I was on the ground.

My operations covered longitudes 49 deg. 30 min. W. to 48 deg. W. and latitudes 41 deg. 20 min. N. to 42 deg. 30 min. N., and no field ice was seen at any time; but at first a large number of icebergs were seen, from the lofty berg to the growler; then they disappeared, and only one was seen on the return trip. It is my opinion that few bergs remain in latitudes 41 deg. 30 min. to 42 deg. in the longitudes between 49 deg. and 49 deg.

The Minia, although fitted for only 200 miles wireless communication, was able to keep in touch with Cape Race the whole time at a distance of 350 to 370 miles, but only at night, and not always through the night. It sometimes happened that after receiving " "Go ahead" from Cape Race, and, the message being sent, on asking if Cape Race had it, no reply would be forthcoming, the signals having failed, and after a few hours they would be as good as ever. This perhaps explains why so many messages went astray and were not answered at the time of the Titanic accident. It seems to me that the time has arrived when all ocean-going vessels should be compelled by law to have a wireless outfit of not less than 100 nautical miles, whether they carry passengers or not, for a vessel, near to one requiring help, might as well be a hundred miles off if she has no wireless, for all the assistance she can render.

CARPATHIA'S CREW HONORED.

ON the arrival of the "Carpathia" in New York on May 29 from Naples, she was boarded by a committee of Titanic" survivors bearing a loving cup and gold medal for Capt. Arthur H. Rostron and silver and bronze medals for his officers and crew. Chairman Frederick K. Seward headed the comtee, and the presentation took place in the "Carpathia" dining room, where were assembled the entire ship's company.

Having feelingly thanked the committee for the loving cup and medal. Capt. Rostron said: — "I will not take the credit for the achievement of that night when we went to the aid of the people of the 'Titanic.' I do not deserve this credit. My crew does, and to them I want to give my heartfelt thanks for their loyalty and fidelity to the trust imposed. I cannot think of them too highly, for they have brought this honor to me and to themselves, and I feel humbly pround for what has been done for me through their valor."

Chairman Seward then spoke to the crew, saying in part:—"The eyes of the world are upon you and were upon you when you saw us on the open ocean, when we saw the 'Carpathia' coming to us out of the dawn. To all of you we wish to give our heartfelt thanks. For your hospitality, devotion, unselfishness, and for all that was done for us, we never can be adequately grateful, and as a slight token of that appreciation we wish you to accept the medals that we have had struck for every man and woman of this ship."

The medals bore in bas-relief a copy of the "Carpathia" going at full speed to the rescue of the "Titanic's" victims, while the reverse side bore the following:

"Presented to the captain and crew of the R.M.S. 'Carpathia' in recognition of their gallant and heroic services, by the survivors of the S.S. "Titanic," April 15, 1912." There were six gold medals, one each for Capt. Rostron, Chief Engineer Johnson, Surgeon Frank E. McGee, Purser E. G. F. Brown, R. N. R.; Chief Steward E. H. Hughes and Second Engineer Marshall.

At the request of the committee, Capt. Rostron handed a medal to each member of the crew as they responded to their names called by Purser Brown; each man saluting the commander as he received his decoration, while his shipmates cheered. The junior officers received silver medals and the crew bronze. In speaking of the honor that had been accorded to him by the United States Government, Capt. Rostron said that he was proud for himself, the officers and the crew of the "Carpathia," and for the Cunard Line, and that he believed the whole mercantile marine of the world would feel honored by it.

Baltimore. The Skinner Shipbuilding & Drydock Co., Baltimore, is preparing plans for a steel oil barge, 153 ft. long and 23¼ ft. beam, to be built to the order of the Gulf Refining Co., New York.

Marine News From Every Source

British Columbia

Vancouver.—Norton, Griffiths & Co., Ltd., contractors, etc., passed a by-law at a special meeting of shareholders in Vancouver, B. C., May 10, increasing the number of directors from five to ten, of whom four must be residents of England, and six residents of Canada. Two directors shall form a quorum. F. Carter-Cotton, of Vancouver, is president, and F. Molyneux, secretary.

Victoria.—The Eastern Asiatic Steamship Co., trading from Copenhagen and Antwerp to United States Pacific ports, is stated to have arranged to make calls at Victoria, B. C.

Victoria.—The Merchant Service Guild, which was organized recently by captains and other officers, and which has its headquarters at Victoria, B. C., has elected the following officials:—

Trustees—Captains B. L. Johnson, J. Parkes, D. Owen.

Executive Committee—Captains Johnson, Shadforth, Whitley, Wearmouth, Davies, Gilchrist.

Secretary-Treasurer—Captain D. J. Jarvis, R.N.R.

Vancouver.—The Union Steamship Co. steamer Chelohsin, which recently struck a rock in the Skeena River, was docked at Vancouver on May 3, for examination and repairs. It was discovered that about 100 frames would have to be straightened, and a number of plates renewed, at an approximate cost of $25,000. The Chelohsin only arrived on the coast in February, from Dublin, Ireland.

Prince Rupert.—The G. T. Pacific Coast Steamship Co. has decided to equip its steamships Prince Albert and Prince John with oil burning apparatus, similar to that installed on its steamships Prince Rupert and Prince George. This change may not be made until the fall, as it may not be convenient to take the vessels out of service until then.

Victoria.—The C. P. R. commenced its new service between Victoria, B. C., and Tacoma, Wash., on May 15, with the steamer Iroquois. The service is a daily one, and the vessel calls at Seattle each way.

Vancouver.—The C. P. R. steamship Princess Sophia, which recently arrived here from Scotland, has been placed on her route between Vancouver, Prince Rupert and Queen Charlotte Island ports. She is a single screw vessel, with triple expansion engines, having a speed of 13 knots an hour, and has been equipped so that she may use either coal or crude oil as fuel. Her dimensions are:—Length, 247 ft.; breadth, 44 ft.; depth, 18 ft.

G. T. P. Steamships.—The Grand Trunk Pacific Coast Steamship Co. has made a number of changes in the officers of its vessels. D. MacKenzie, captain of the Prince Albert, has been transferred to the Prince George, vice F. T. Saunders, appointed agent of the Department of Marine at Prince Rupert; D. Donald, captain of the Henriette, has been transfered to the Prince Albert, and D. O'Brien, of the Prince George, has been appointed captain of the Henriette.

Vancouver.—The British steamship Hillcrag, formerly known as the Bannockburn, which was in Vancouver harbor last fall, has been purchased by the Nippon Yusen Kaisha Steamship Co., of Japan. The Hillcrag was built by Russell & Co., at Port-Glasgow, Scotland, in 1908, and is 3,150 tons net register. She was purchased by the Jetsam Shipping Co. last September for $210,000, and now she has been turned over to the Nippon Yusen Kaisha Co. for $270,000. Shipping interests in Japan have also purchased the British steamer British Monarch, 2,547 tons, at a figure of $150,000. She was built at Port-Glasgow by Russell & Co., in 1902, and previous to the recent transfer was owned by the Monarch Steamship Co. This concern are also owners of the steamer Ocean Monarch, which was here recently with a steel cargo from New York under charter to the Maple Leaf Line, and of the steamer Irish Monarch, which will shortly arrive with sugar from Java.

Quarantine Stations.—So rapidly is the shipping of British Columbia developing that the Government at Ottawa has been called upon to establish two new quarantine stations on the Pacific seaboard. Notices to mariners have just been received here which state that an inspecting officer has been stationed at Port Alberni and another at Prince Rupert. Previously any boats bound from foreign ports to Prince Rupert were obliged to call at William Head to obtain a clean bill of health, but now they will be able to proceed on to Rupert, providing they have no cases of illness requiring fumigation.

The Great Lakes

Ottawa. — The Canadian Brazilian Shipping Co., with head offices in Toronto ,has been incorporated, with a capital of $300,000.

Sarnia.—Efforts to use steam pumps in removing part of the ore cargo of the sunken steamer Joliet have been abandoned. Captain Smith of the Pittsburg Steamship Co., after trying these, found that the ore clogged the suction pipes. The lighter Newman has, consequently, been brought into service, to take the ore out with her clamshell. About 1,000 tons of ore will be lightered before Capt. Smith again attempts to raise the Joilet with barges, serving as pontoons. The wreck lies directly in mid-channel, opposite here.

Port Arthur.—The Western Drydock & Shipbuilding Co. will construct the following buildings this season:—power house 50 ft. x 105 ft; warehouse 60 ft. x 120 ft.; joiner shop, 60 ft. x 160 ft.

SS. Turret Cape.—The Canadian Lake and Ocean Navigation Co. has withdrawn the abandonment of the steamer Turret Cape, and having accepted $35,000 in settlement of its claim against the underwriters, has resumed possession of the vessel. The Turret Cape went aground in a snow storm last October on a reef off Cove Island, Georgian Bay, while on her way (light) up the lake.She was believed to be a total wreck, and was abandoned. She was, however, floated by the underwriters and now the abandonment has been withdrawn. Repair and overhauling of the vessel has been started by the Canadian Lake and Navigation Co. at Collingwood, and Mr. J. W. Norcross, the manager, hopes to have her in commission again in a few weeks. The wrecking bill and the settlement with the owners is said to have cost the underwriters about $50,000.

Welland Canal.—The award of contracts for the construction of the Welland Canal will not be made until late in the fall. The delay is attributed by the Government to the magnitude of the work and the necessity for further statistical and detailed information concerning the undertaking.

Kingston.—The protest which Francis King, counsel for the Dominion Marine Association, made to Washington against the refusal of the local inspectors of steamboats at Oswego, N.Y., to inspect Canadian steamers, has borne fruit. Mr. King received a letter from Benjamin J. Cobb, acting secretary of the Department of Labor and Commerce, which reads in part as follows:—"It has long been the practice for inspectors of this country stationed at ports on the Great Lakes to inspect Canadian vessels at their home ports when requested by the owners, and this practice has been quite satisfactory to all interests. The local inspector at Oswego, New York, has been instructed by the supervising inspector-general, Steamboat Inspection Service, this Department, to continue to inspect Canadian vessels at their home ports when requested."

Ottawa.—The Department of Marine and Fisheries has awarded a contract for two new dredges to the Collingwood Shipbuilding Co. A new stone lifter is to be built at Sorel.

Port Colborne.— The steamer Lakeside, towing two new steel scows from Port Burwell recently, lost one of her consorts when off Long Point. A strong south-west wind prevailed, and the scow upset and then sank. The Lakeside sheltered under Long Point. The scow and equipment was valued at $20,000.

Ottawa.—A new Government cruiser for the Customs service is to be placed on the St. Lawrence. Plans have been prepared providing for a vessel 180 feet in length. Another new vessel is to be placed on Lake Winnipeg.

Kingston. — The steamer Cornwall, formerly owned by the R. & O. Navigation Co., has arrived at Garden Island, having been purchased by the Calvin Wrecking Co. The boat was remodelled at Sorel, Que., for wrecking purposes.

Sault Ste. Marie.—The large Canadian tug W. A. Booth has been purchased by the Great Lakes Dredge and Dock Co., and will be taken to Sault Ste. Marie to work on Government contracts. The price paid for the Booth is understood to have been $4,500. The boat is 81 feet in length, and was built in 1871.

St. Mary's Canals.—The May traffic through the St. Mary's Canals eclipsed the record for several years. Since the opening of navigation this year there has been no cessation of traffic past the Sault, and during the last half of May the line of steamers waiting their turn through the locks never has been cleared up. An average of nearly 100 vessels a day has been handled through the canals. This procession of steamers serves as a good indication of the present state of commerce in the United States and Canada. It also demonstrates the necessity of the third lock at the Sault, on which work is now progressing. Although the Weitzel lock is doing its share in the handling of smaller boats, the bulk of the work is done at the Sault by the Canadian locks.

Port Arthur.—The new Mutual Line steamer Hamiltonian was launched at Port Arthur at noon on Saturday, May 25. This is the first big steamer built on the Canadian side of Lake Superior. Its dimensions and other particulars are:—Length over all, 257 feet; length between perpendiculars, 244 feet; beam 42 feet 6 inches; depth, 26 feet 6 inches; number of hatches on main deck, 6; number of hatches on lower deck, 7; engines, triple expansion with 18 inches high pressure, 29 inches intermediate pressure, 48 inches low pressure cylinders of 40 inches stroke; boilers, Scotch marine type, 11 feet 6 inches in diameter, and 11 feet 6 inches long; working steam pressure 180 pounds, with Ellis and Eaves' induced draft system. The hull is built on the Isherwood system and the vessel will carry 24 of a crew. She will have a speed of about 11 knots an hour.

The steamer was christened by Mrs. Alice Whalen, mother of Mr. James Whalen, president of the Western Dry Dock & Shipbuilding Co.

Toronto.—The Polson Iron Works of Toronto, have secured a contract from the Dominion Government for the construction of a large sea-going tug, 80 feet long, 20 feet beam, and 7 feet draught, of steel construction throughout. It will have all modern appliances, including a complete electric light plant and a powerful searchlight, and will be driven by compound engines, having cylinders 12 and 26 inches diameter, by 18inches stroke. The boiler will carry a working pressure of 150 lbs., and the engines will develop about 300 horsepower. The speed of the boat will be about 14 knots per hour, and she will be used by the Department of Public Works, probably on the St. Lawrence River. The contract price is $35,000 and the tug will be handed over late this fall.

Trenton. — The report comes from Picton that the Ontario & Quebec Navigation Co. has purchased the steam barge Wiley M. Egan. Captain Nelson Hodgin will be in command and Len. Smith, engineer. The Wiley M. Egan was owned at Erie, Pa.

Toronto.—H.H. Wylie has purchased the screw steamer City of Chatham for the Grimsby Beach and South Shore Navigation Co., Ltd., to operate between Toronto and Grimsby Beach. The City of Chatham is a boat of exceptional rough-weather qualities, and especially suited for the day excursion business.

Owen Sound.—The steamer Exile with the towing barge Emma Thompson, narrowly escaped being wrecked while on a trip to Owen Sound recently. Off Cabot's Head the vessels encountered very heavy weather, and after eight hours of rather exciting experience, both vessels put into Tobermoray for a day and night. Both vessels lost their deck cargoes of coal. The Exile had a cargo of four hundred and fifty tons of coal for the Owen Sound municipal electric plant and the barge had on three hundred tons for the same destination.

Steamer Sale.—It is understood that the steamer "Manita" of the Otonabee Navigation Company's fleet has been sold to Mr. G. N. Gordon, representing others. Negotiations are under way for the purchase of three other of these boats, the "Otonabee," "Monarch," and "Water Lily."

Parry Sound. —The paddle steamer Ella Rose, owned by C. A. Phillips, of this place, was destroyed by fire quite recently. The steamer has been employed in the summer trade between here and Point au Baril, and the work of fitting her out to commence running on the 15th, had only begun. The stoker, George Landrigan, was the only person on board, and he barely escaped with his life. He had one of his hands badly cut in breaking a window and escaping to the dock. The steamer was built at Deseronto some years ago, and had a steel hull.

Ottawa.—Plans have been completed and tenders will be called shortly for the construction of a new Government steamer to be used in the customs patrol service in the Gulf of St. Lawrence. The vessel, of steel, will have a length of 200 feet, and cost a quarter of a million dollars.

Kingston. — The Toronto steamer Conger, on her way from Lake Erie to Montreal with a cargo of coal, went aground near Clayton's as a result of her rudder chain breaking. She came off after her cargo has been lightered.

Port Colborne. — An effort will be made to raise the $20,000 steel dump scow belonging to Contractor Hogan of Port Colborne, which was lost in Lake Erie while being towed to Port Burwell by the steamer Lakeside. The scow has been located and buoyed, and it is not expected that any difficulties will be experienced in raising her.

Amherstburg.—Captain W. W. Smith, marine superintendent of the Pittsburg Steamship Co., has leased from the Trotter Towing & Wrecking Co., Am-

herstburg, several big steam pumps for use in raising the wreck of the Str. Joliet in St. Clair River opposite Sarnia. The tug Marion E. Trotter has conveyed the pumps to the wreck of the Joliet.

Amherstburg.— Miss Annie Hackett is reported to have sold the tug Home Rule to Capt. James Whalen of Port Arthur. The Home Rule, which has formed part of the Hackett line of tugs, left for the Canadian head of the lakes. Competition by the Great Lakes Towing Company's fleet has left little business about Amherstburg for the Hackett tugs. The big steel tug Francis B. Hackett, which was built as an ice-breaker, is working under charter this season for the Great Lakes Dock and Dredge Co., on harbor improvement contracts on Lake Erie. The tug D. N. Runnels has been idle at her dock here for the last two years.

Ottawa.—The Customs department is co-operating with the Department of Marine in perfecting the service for recording movements of steamers on the St. Lawrence route. This move is made as calculated to operate a reduction of insurance ratings.

Ottawa.—The Furness-Withy subsidy contract for the steamship service from St. John and Halifax to Liverpool has been renewed by the Government.

Goderich.—With 35,000,000 bushels of grain to be moved from the head of lake navigation, there is every prospect that the elevators at every lake port will be kept busy for some time. Goderich is sharing in this activity, and already there is ample evidence that we need additional storage capacity for at least one million bushels. The directors of the Transit Company are considering the situation and say that if certain conditions can be met they will add another annex to the east of the one they completed last year. These conditions are the securing of lots alongside the G.T.R. tracks at the east end of the harbor, and the cutting out of a part of the island, so as to allow vessels to lie between the new building and the island. How best to utilize the island and the whole east end of the harbor where the sawmill so long stood is a problem for the Government to consider, but there is room to hope that the improvements now in full swing transforming the harbor will ere long be continued till the east end is also included.

Kenora, Ont.—The Public Works Department will commence the construction of a new dock at this point. The dock will cost about $11,800 and will be under the supervision of W. G. Earle, district engineer of this department.

St. Catharines.—A serious break on the Welland Canal was recently averted when the Gowan safety device for lock gates prevented the carrying away of the head gates of lock 24, at Thorold, after they had been struck by the steamer Beaverton. The steamer was up-bound and had entered and locked all right, but the breaking of a cable caused her to forge ahead and force the gate several inches. The Gowan device worked admirably and forced the gates back into mitre before the rush of water from the mile level above could tear them off. The device has been on these gates for a couple of years, but this is the first test it has had. It is patented by N. W. Gowan, of St. Catharines.

Hudson Bay.—On July 1, the first boat of Mr. F. H. Clergue's Hudson Bay Navigation Co. will sail from Montreal for the mouth of the Nottaway River, James Bay, the ultimate terminal of the Algoma Central Railway.

Hudson Bay.—The Government tugs, Arctic and Minto, will go to Hudson Bay with Government engineers to determine the merits of Nelson and Churchill.

Hamilton.—Traffic in and out of Hamilton harbor was completely tied up through the injury that was done to the G.T.R. swing bridge at the Beach by the A. E. Ames. The steamer was leaving port early in the morning. As she neared the piers, she whistled, and the captain expected that the bridge would be swung. It was not, however, and the steamer crashed in, doing serious damage. The vessel was not injured and proceeded to Toronto, as the bridge was left open sufficiently to enable her to pass.

Oil Vessel Toiler.—The Toiler has been sold to a syndicate, in which Jas. Playfair, of Mildand; H. W. Richardson, of Kingston, and H. H. Gildersleeve, of Sarnia, are principally interested. She will be operated under the management of J. Richardson & Sons, Kingston, trading almost exclusively between Montreal and Port Colborne, and possibly to Lake Erie ports for coal.

Canadian Northern Railway. — The Canadian Northern Railway are contemplating the building of another trans-Atlantic ocean liner for their Royal fleet. It is understood that plans for the proposed vessel will be called for immediately, and that they will be along the same lines as the Royal Edward. It is the intention of the railroad to have the new boat ready for ocean traffic about the same time as the new trans-continental line will be finished. This will be about the spring of 1914.

Port Arthur—The Whaleback steamer John B. Trevor, which foundered off Isle Royale in the fall of 1910, is now in the Western drydock, Port Arthur, for repairs. When completed she will be placed in commission in the grain carrying trade.

Port Arthur—The Chicago and Duluth Transportation Co., one of the foremost concerns in United States waters, announces that it will include Fort William and Port Arthur in its route this summer. As a starter, the big steamer Minnesota will arrive once a week. This boat, one of the finest of the company's fleet, made her maiden trip in June a year ago. She is due at Port Arthur every Wednesday morning and will call at the Soo and Duluth. George Rapsey has been appointed agent for the company at Port Arthur.

Ottawa.—The Government has taken up the question of a fast steamship service between Canada and the West Indies, and tenders are being called for, one from Canadian ports to British Guiana, calling en route at the Islands which have signed the trade agreement with the Dominion. Fast and commodious vessels designed to carry both passengers and freight are being called for. The second service is between the Maritime Provinces and Jamaica, touching at Bermuda. Jamaica has already promised a $100,000 subsidy yearly towards the project. It will connect with lines to Great Britain from Halifax and St. John. When the trade agreement between the West Indies and Canada was signed, it was decided that faster steamship facilities were absolutely necessary, and the present enterprise is an outcome.

Toronto.—The yacht Way Wasson, purchased recently in New York by Mr. Lawrence Solman and Mr. R. A. Smith, arrived at Hanlan's Point recently from New York in charge of Commodore Williams and Engineer John Pickett. The yacht made the trip from New York in remarkably fast time, coming by way of Albany, N. Y., and the Erie Canal. She met with very heavy weather crossing Lake Ontario from Port Dalhousie, but rode the heavy seas well. The Way Wasson is 65 feet long, with a beam of 14 feet, and is beautifully fitted up.

Ottawa.—The Belle Isle Park Co., Ottawa, has purchased the steamboat Quinte Queen, for operation between Ottawa and Kettle Island, where the company's amusement park is situated. The Quinte Queen was built at Valleyfield, Que., in 1902, and is screw driven by an engine of 13 n.h.p. Her dimensions are—length, 99.5 ft.; breadth, 20.9 feet; depth, 4.7 feet; tonnage, 203 gross, 143 register.

Collingwood.—Mr. F. Mitchell, land steward, Northern Navigation Co., Collingwood, has been appointed Chief of Commissary, with full charge of the cabin departments on all the company's vessels and the land stewards' offices at

Collingwood and Sarnia; also the operation of, and the linen at, the company's laundry at Saulte Ste. Marie, Ont. His office is at Collingwood.

Ottawa.—The Minister of the Interior, after investigating the question as to whether it would be feasible to lengthen the season of navigation, considers that the season might be continued through December, instead of closing on Dec. 1 as hitherto, and that Thunder Bay could be kept open for navigation by means of powerful ice breakers, thus allowing about 20,000,000 bushel of grain to be shipped that would otherwise have to be stored at Fort William and Port Arthur for the winter.

Hamilton. — The works which, it is stated, will be undertaken for the improvement of Hamilton harbor during the current season include the continuation of the revetment wall for 466 feet in line with the east side of Wellington street produced; the construction of close sheet piling with concrete superstructure to connect the revetment wall with the shore of Wellington street, and filling in at back of same; extensions of existing channels, and the construction of a wharf, 450 by 50 feet. The Dominion Parliament has voted $200,000 on account of the work, and plans have been prepared and filed with the Department of Public Works, together with a report by J. G. Sing, Government Engineer.

Northern Navigation Co.—The Northern Navigation Co. has contracted with the Marconi Wireless Telegraph Co. of Canada for the equipping of its steamboats Hamonic, Huronic and Saronic, with a wireless telegraph installation, and it is expected that the installations will be completed before the heavy passenger season commences.

Port Colborne.—The steamer Fairfax had the misfortune to lose her rudder while passing the steamer Turret Court in the Welland Canal at Welland Junction. The Fairfax got in too close to shore, and her rudder grounded, breaking right off. She proceeded to this port for repairs.

Toronto.—The Peoples Steamboat Co., Ltd., has been incorporated under the Ontario Companies Act, with a capital of $150,000, and offices at Toronto, to take over the business of the Argyle Steamship Co., Ltd., and the steamboat Argyle, which was formerly operated between Toronto and Olcott Beach, N.Y. The Argyle was built at Picton, Ont., in 1899, and is a paddle wheel steamer. Her dimensions are—length, 185.1 feet; breadth, 26 feet.; depth, 9.7 feet; tonnage, 700 gross, 374 register. It is the intention to operate the vessel between Toronto and Lewiston, N.Y., twice daily commencing towards the end of June. The officers of the company are:—President, F. Denton, Toronto; vice-president, C. W. Perkins; managing director, H. W. Crawford, Toronto; other director, J. J. Doyle, Niagara-on-the-Lake, Ont.

Fort William.—Inaugurating a new route between Fort William and Newfoundland, the steamer Sinbad departed on Saturday, June 15, with a full cargo of flour.

Windsor.—The Marine and Fisheries Department is soon to begin the reconstruction of a breakwater along the beach in Maiden Township, which has been washed away by swells from the passing steamers. The wall will cost $3,000, and the contract has been awarded to Captain John McQueen of Amherstburg.

Port Huron. — The steamer John Sharples, which went ashore on Gallipon Island, Lake Ontario, last fall, and was released by the Reid Wrecking Company, finished her repairs and overhaul and cleared for Montreal, where she goes into the pulp trade between that point and Erie.

Athabasca River.—Navigation opened on the Athabasca River, May 6, when the Hudson Bay Co. sent its first vessels down the river from Athabasca Landing. Vessels are also running up the river as far as Little Slave Lake.

Montreal and Quebec

Sorel.—The Sincennes McNaughton Co. tug Nathalie R. was launched at Sorel recently. A similar tug is under construction there for the same company, and a third is being built in Scotland. The last mentioned is to be named Aurelie G., and will cross the Atlantic under her own steam, some time during the present month.

Levis.—The shipbuilding and repairing plant which has been operated at Levis by G. T. Davis & Sons for some years has been sold to the Quebec Wrecking & Salvage Co., Ltd., in which it is said A. A. Allan, of the Allan Line, and F. L. Wanklyn, General Executive Assistant, C. P. R., are chiefly interested. The plant, which has not been successful for the past three years, received a subsidy of $10,000 a year from the Dominion Government, and on representations being made to that quarter recently, it is stated that a promise was made that the amount would be increased to $25,000 annually.

Montreal.—The Cairn Dhu, a fine new freighter, has been added to the fleet of the Cairn-Thompson Line, of which Robert Reford & Co. are the local agents. The Cairn Dhu is on her maiden voyage, bound for this port.

Montreal.—The annual report of the Deputy Minister of Railways and Canals discloses the fact that American tonnage, both in vessels and freight, has far outstripped Canadian tonnage in the grain trade, and that the Americans are using the free Canadian canals to a much greater extent than are the Canadians.

Quebec.—According to a report from Quebec City, the Harbor Commissioners have decided to inagurate extensive improvements. They will call for tenders

STEAM VESSELS REMOVED FROM THE CANADIAN REGISTER, APRIL, 1912.

Official No.	Name of ship.	Port of registry.	Net tonnage	Cause assigned.	Date of loss
103,027	Annie Blanche...	Parrsboro'	68	Sunk	March 29, 1912
96,722	Bridgetown	Chatham, N.B. ..	10	Broken up	
116,271	Enterprise	Halifax, N.S.	14	Broken up	
100,302	Georgia	Windsor, Ont. ...	19	Out of existence	
107,106	Olive	Victoria, B.C.	4	Broken up	
	5 Vessels	....	115		

STEAM VESSELS REGISTERED IN CANADA, APRIL, 1912.

Official No.	Name of Ship	Port of Registry	When and where built	Length	Breadth	Depth	Gross tonnage	Regd. tonnage	Engine H.P.	Owner or Managing Owner.
130,635	A. J. Weaton ...	Saint John.....	1912 St. John, N.B.	29.2	9.5	4.9	10	7	2	Allen John Wheaton, St. John, N.B.
[illegible]	Circle B	Vancouver	1911 Eburne, B.C.	42.0	10.4	3.7	13	9	2	Dominic Burns, Vancouver, B.C.
[illegible]	D. S. Pratt....	Midland	1911 Midland, Ont.	81.3	20.0	10.5	161	74	43	Can. Dredging Co., Midland, Ont.
[illegible]	Degen	Lunenburg	1912 Tancook, N.S.	45.0	10.4	5.8	13	12	2	Ernest Covey, M.O., Tancook, N.S.
[illegible]	Edrie	Vancouver	Unk'n U.S.A.	92.3	18.0	6.8	110	75	10	Brit. Columbia Fisheries, Ltd. Victoria.
130,617	F. H. Folsom..	Victoria	1898 Portland, Ore.	80.9	15.8	7.3	61	37	17	Brit. Columbia Fisheries, Ltd., Victoria
[illegible]	Harbport I	Vancouver	1912 Vancouver, B.C.	59.0	16.2	8.2	50	34	5	Charles H. Leigler, Vancouver, B.C.
[illegible]	La Ollee	Vancouver	1911 Vancouver, B.C.	64.0	13.0	4.6	35	24	2	Rob. P. McLennan, Vancouver, B.C.
[illegible]	Sadie J.	Kenora	1911 Kenora, Ont.	52.0	12.5	5.0	31	21	3	Armstrong Trading Co., Ltd., Portage-la-Prairie, Man.
[illegible]	Rupert City...	Vancouver	1886 Bar.-in-Furness, G.B..	310.3	38.1	25.2	2,898	1,999	300	Fenwick S. Watts, London, Eng.
[illegible]	Tadzuma	Vancouver	1908 Nanaimo, B.C.	37.0	9.3	3.4	9	6	2	Chiyo Uchido, Vancouver, B.C.

for the construction of a grain elevator of from one to two million bushels capacity, to be erected between piers 1 and 2 of the breakwater extension connecting with the Louis embankment. The commissioners have decided to cut away the east ends of the customs and East Indian wharves and bring them in line with the pontoon. Tenders for the construction of a capacious car ferry to be used to transport cars across the river during both winter and summer, are to be asked for. About $1,000,000 will be spent this summer.

Montreal. — Capt. Louis A. Demers has been made harbormaster of Montreal. The French press unanimously insisted on a Frenchman being appointed.

Montreal.—The report of the Harbor Commissioners, just issued, shows that during the year 1911 the business of Montreal port increased tweny-five per cent. over that of the previous year. The receipts on revenue account increased by $100,000. The amount expended in construction work of various kinds was also in excess of that for 1910. The report points out that the new elevator with a capacity of 2,000,000 bushels, will be in operation in June, while the new drydock will arrive in July. The combined registered tonnage of the 767 vessels which entered the harbor during the past year was 2,300,000 tons. Of the vessels, sixty-seven per cent., or 520, flew the British flag.

Montreal.—Improvements to cost $2,000,000 have been begun on the Montreal harbor. They include the erection of a new 1,200-foot pier, the lengthening of several others, and the deepening of basin No. 1. These improvements have been rendered necessary by the longer and larger ships now coming into this port. The entrances to the Lachine Canal will be moved over in their entirety to a point opposite an open space between Mackay Pier and Windmill Point, which is being reserved for the Georgian Bay terminals.

Quebec. — The Quebec Wrecking & Salvage Co. has taken over the equipment of the Davis Co., Quebec.

Montreal.—A Dominion charter has just been granted to Collier, Newton & McCombe, Ltd., who will carry on a business as engineers, contractors, and metal merchants. The principal incorporators are E. V. Collier, late of E. V. Collier & Co., S. G. Newton, late erecting engineer for the National Bridge Co., and Gault McCombe of Gault, McCombe & Co. The offices of the new firm will be 624 Coristine Bldg., Montreal.

Maritime Provinces

Halifax.—The Norwegian steamship Raum, which went ashore off the bar near the eastern entrance to Liverpool harbor, was pulled off at high tide by two government cruisers and sailed for New York with her cargo of pulp.

every 12 days from St. John, N. B., and Halifax, N. S.

Great Britain and Ireland

Rosyth Naval Base.—The third graving dock, which is to be provided at Rosyth dockyard, will, like the others, be 900 feet in length, and will cost about $1,250,000. The site is now being surveyed, and the dock will be located just to the east of the other two, occupying all the ground available in that vicinity. Of the first two docks, one has been formed to the necessary depth, and the laying of the concrete bottom, 25 feet thick, has been started. In the other, the work of excavation is well advanced. The basin in which battleships are to be berthed is being excavated in two parts, separated by an earthen embankment. This embankment, almost completed, is intended to exclude the sea from one-half of the basin, so that work may proceed there while the monoliths, on which the outside quay is to be constructed, are being sunk. When these are all in position, the other half of the basin will also be cut off from the sea. So far, about 80 of the monoliths have been sunk.

Clyde Output for May.—During the month of May, 54,000 tons of new shipping was launched on the Clyde. This is an amount considerably above the average, although it compares unfavorably with the corresponding month of last year, when several warships and a number of large liners were included in the total, which reached 93,800 tons. The contracts placed during the month include four torpedo-boats for the British Admiralty, a steamer for the Union Castle Line, and two P. and O. steamers of 11,000 tons each.

SAILING VESSELS REMOVED FROM THE CANADIAN REGISTER, APRIL, 1912.

Official No.	Name of ship.	Port of Registry.	Net Tonnage.	Cause assigned.	Date of loss
.....	Alexander	St. Catharines ..	351	Lost	1909
.....	Archie	St. Catharines ..	172	Lost	1902
85,417	Emerald	St. Catharines ..	322	Lost	1909
94,771	Florence M. Smith..	Sydney, N.S.	99	Lost	Nov. 13, 1911
100,347	Hibernia	Maitland, N.S. ..	298	Abandoned at sea	
75,650	Malta	St. Catharines ..	198	Lost	
.....	Mary Ellen	Port Hope, Ont..	51	Out of existence	
85,416	Pride of America...	St. Catharines ..	285	Lost	
72,953	Sylvester Neelon....	St. Catharines ..	291	Lost	1907
	9 Vessels	....	2,067		

Courteney Bay, St. John, N.B.—The harbor improvements , etc., at this point, for which the Dominion Government has awarded a contract to Norton Griffiths & Co., Ltd., (Canada), are to be completed by March 30th, 1917, and embrace:

The construction of a breakwater 4,570 ft. long, including that of five groynes each 150 ft. long.

The dredging of a channel about 6,800 ft. long and 500 ft. wide at bottom to a depth of 32 feet below low water, from the main ship channel leading into the St. John River to the head of the breakwater mentioned above.

The dredging of a basin to a depth of 32 ft. below low water in Courteney Bay.

The construction of about 4,890 lineal ft. of quay walls.

The filling of an area of about 28 acres.

The construction of a dry dock of the first-class.

Halifax.—The Dominion Government has granted a subsidy to Pickford & Black, Ltd., for a West Indies service,

SAILING VESSELS REGISTERED IN CANADA, APRIL, 1912.

Official No.	Name of Ship	Port of Registry.	Rig.	When and where built	Length	Breadth	Depth	Regd. tonnage	Owner or Managing Owner.
130,634	Beaver	St. John	Dredge	Unk. U.S.A.	104.8	40.6	10.0	514	Beaver Dredging Co., St. John, N.B.
130,827	Elsie L. Corkum.	Lunenburg ..	Schr...	1912 LaHave, N.S.	101.5	26.0	10.6	97	Harold Corkum, M.O., LaHave, N.S.
130,830	Flor. E. Getson.	Lunenburg ..	Schr...	1911 LaHave, N.S.	104.8	26.2	10.2	99	Norman Reinhardt, M.O., LaHave, N.S.
130,825	Frank J. Brinton.	Lunenburg ..	Schr...	1912 Mahone Bay, N.S....	96.2	25.0	10.3	92	Wm. Gilfoy, M.O., Lunenburg, N.S.
130,829	Marion A. Silver.	Lunenburg ..	Schr...	1912 Lunenburg, N.S.	106.8	26.3	10.4	99	Alvin Himmelman, M.O., Rose Bay, N.S.
130,822	Matanzas	Lunenburg ..	Schr...	1912 Lunenburg, N.S.	106.8	26.0	10.6	96	Naaman Wentzel, et al., Rose Bay, N.S.
130,826	Original	Lunenburg ..	Schr...	1912 LaHave, N.S.	104.8	26.2	10.2	98	Roger Conrad, M.O., Rose Bay, N.S.
130,828	Ph. L. Westhaver.	Lunenburg ..	Schr...	1912 Lunenburg, N.S.	106.8	26.3	10.4	99	Mahlon Rodenhiser, M.O., Lunenburg, N.S.
130,506	R. L. MacKenzie.	Shelburne ...	Schr...	1912 East Jordan, N.S. ...	56.8	17.6	6.9	33	Ralph MacKenzie, M.O., East Jordan, N.S.
130,616	V. I. T. No. 2...	Victoria	Barge .	1912 Victoria, B.C.	85.0	28.0	7.9	155	Vancouver Island Tow. Co. Victoria, B.C.
130,824	W. H. Smith....	Lunenburg ..	Schr...	1912 Mahone Bay, N.S....	103.0	25.5	10.5	94	William Smith, M.O., Lunenburg, N.S.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals who Have Been More or Less Prominent in the Marine Sphere

R. B. Wallace, assistant purser on the G.T.P. steamer Prince George, has been promoted purser on the Prince Albert in place of C. W. Harris, who has been given a similar position on the Prince John.

* * *

Captain Thomas Lundy, for years a familiar figure in Toronto nautical circles, died on June 14, at the age of 84 years. Captain Lundy was in charge of the steamer Mary Grover, the first boat to sail through the eastern gap. He had charge of wrecking tugs for many years, and for three years commanded the Toronto harbor tug.

* * *

Morris F. G. Wilson, an eminent English authority on drydock construction, will act for the government in the selection of a suitable site for the proposed Quebec drydock. Mr. Wilson has had a wide experience in the building of drydocks in England and other parts of the world. Various conflicting views have been put forward from time to time as to the best location for the drydock, and the bringing out of the expert from England will settle any doubts as to the best site from a practical standpoint.

* * *

Mr. John L. Weller, superintending engineer of the Welland Canal, at St. Catharines, Ont., has been appointed engineer in charge of surveys, design and construction of the new Welland Ship Canal connecting Lakes Erie and Ontario. This canal will have a depth of 30 feet of water on the miter sills, a bottom width of 200 feet, and will overcome a difference in levels of 326 feet in 25 miles. Mr. W. H. Sullivan, who has been assistant to Mr. Weller for several years, has been appointed superintending engineer of the present Welland Canal system to succeed him.

* * *

Captain Arthur H. Rostron, of the steamship Carpathia, which brought into port the survivors of the Titanic disaster, was recently presented with a draft for $10,000, a fund subscribed by readers of the New York American. The presentation ceremony took place aboard the liner at her pier, New York. Capt. Rostron, in accepting the gift, said that whatever part he had played in the Titanic tragedy was due to the loyalty of his crew, and it grieved him, he said, to know that honors were being thrust upon him through the sufferings of others. The largest contributor to the fund was Mrs. George Widener of Philadelphia, whose husband perished on the Titanic. She gave $2,500.

* * *

London.—At the recent congress of Chambers of Commerce of the British Empire, Colonel Ponton, of Canada, carried a motion urging the codification of all the British mercantile marine laws. It was also resolved that the Imperial Government be invited to negotiate with the Dominions in regard to a uniform company law. Sir J. Cockburn, for Australia, proposed the adoption of an Empire trade mark. The resolution was passed.

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Neil J. Morrison, P.O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
Jno. A. Murphy, Midland, Ont., Grand Conductor.
George Bourret, Sorel, P.Q., Grand Doorkeeper.
Richard McLaren, Owen Sound, Ont.
L. B. Cronk, Windsor, Ont.
Grand Auditors.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street, Kingston, Ont.; Captain T. J. Murphy, 111 William St., Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy Street, Kingston, Ont.; Captain James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkey, 17 Rideau St., Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

H. M. S. LION IN COMMISSION

THE battle cruiser Lion was commissioned at Devonport recently for service in the First Cruiser Squadron. It will be remembered that this warship was laid down at Devonport on November 29th, 1909. She is the largest completed warship in the world, being 50 ft. longer than the German battle cruiser Goeben, and 3,800 tons heavier than the British battleship Orion. Her actual dimensions are:—Length, 660 ft.; beam, 88.5 ft.; normal draught, 28 ft.; displacement, 26,350 tons. Her Parsons turbines, of 70,000 h.p., are designed for a speed of 28 knots. The completion of the ship has been largely delayed by the alterations shown to be necessary in the course of the trials to which we made reference in our March issue.

The funnel was originally placed between the bridge and the foremast, and the heat when the ship was running at

Directory of Subordinate Councils for 1912.

Name	No.	President.	Address.	Secretary.	Address.
[illegible]	1	A. J. Fisher,	490 Concord Ave.	E. A. Prince,	61 Elm Grove, Toronto.
St. John.	2	J. F. Matthews,	50 Douglas Ave.,	G. T. G. Blewett,	65 Harrison St., St. John, N.B.
[illegible].	3	Andrew Kerr,	Box 343, Collingwood,	Robert McQuade,	P.O. Box 97, Collingwood,
[illegible].	4	A. E. Kennedy,	395 Johnston Street,	James Gillie,	101 Clergy St., Kingston, Ont.
Montreal,	5	A. F. Hamelin,	3208 Le Tang Street,	O. L. Marchand,	St. Vincent de Paul, P.Q.
[illegible],	6	Alex McNivern,	P. O. Box 234,	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver.	7	A. S. DeGruchy,	Room 23, Williams Bldg.,	E. Read,	859 Thurlow St.
[illegible],	8	Helaire Mercier,	Bienville, Levis,	Jules Lecours,	Bienville, Levis, P.Q.
[illegible],	9	Geo. Bourret,	Sorel, P.Q..	Al. Charbonneau,	P.O. Box 132, Sorel, P.Q.
[illegible] Sound.	10	H. W. Fletcher,	636 4th Ave. East,	E. J. Riley,	1030 1st Ave., Owen Sound, Ont.
[illegible],	11	Alex. McDonald,	Windsor, Ont.,	Neil Maitland,	221 London St. W., Windsor, Ont.
Midland.	12	Jos. Silverthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
Halifax.	13	D. J. Murray,	Victoria Rd., Dartmouth,	Chas. E. Pearce,	Portland Street, Dartmouth, N.S.
[illegible] Marie.	14	Thos. O'Reilly,	Sault Ste Marie,	Geo. S. Biggar,	Sault Ste Marie, Ont.
Charlottetown.	15	J. K. Sutherland,	Charlottetown, P.E.I..	Lem Winchester.	302 Fitzroy St., Charlottet'n, P.E.I.

full power was so terrific as to twist the metal fittings of the bridge and make the fire-control station uninhabitable. It has now been moved further aft, while the fire-control gear has been housed in the conning tower, which has been enlarged for that purpose.

The Lion is the first cruiser armed with the 13.5-inch gun, to be completed. Eight of these weapons are mounted in four turrets on the centre line; the second from forward being raised to fire over the foremost. Four guns thus bear ahead, two astern, and eight on either broadside. Two 21-inch torpedo tubes are fitted, and 16 4-inch guns are mounted for keeping off torpedo craft. The main armour belt is 6 inches thick amidships. The new cruiser is also the first vessel completed for the British navy to cost over $10,000,000. The actual cost of the ship is made up as follows:—

Hull, fittings and equipment.	$4,936,725
Propelling and other machinery	$2,496,515
Gun mountings, torpedo tubes, etc.	$1,671,110
Guns	$591,500
Established charges	$592,690
	$10,288,540

Three vessels of similar design to the Lion are building—the Princess Royal at Barrow (Messrs. Vickers); the Queen Mary at Jarrow (Palmer's Shipbuilding Co.), and the Tiger at Glasgow (Messrs. J. Brown & Co.).

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LARGE DRY DOCK AT LIVERPOOL

THE Gladstone dock at Liverpool, England, on which over 700 men are presently employed, and which it is hoped to complete in the summer of 1913, is 1,020 ft. long, or nearly 140 ft. longer than the White Star Line steamship Olympic. It has an entrance 120 ft. wide. The sill is laid at 25 ft. below Old Dock sill datum, and the floor will be laid at a level of 29 ft. below this datum. The structure of the dock is to be such that it will be available when required as a graving dock for overhauling and repairing the largest steamers that are likely to be met with for some years. With this object the floor will be furnished with centre keel blocks and side blocks. The entrance will be provided with a sliding caisson, which will have a clapping face on each side, so as to maintain the water in the dock or exclude it therefrom, according to the duties required.

The walls, over 60 ft. high, are practically complete, but before the concrete bottom can be laid, there is a large amount of material to be removed. The entrance caisson, 134 ft. wide, is in hand, the builders being the Motherwell Bridge Company. The guy dolphins are in course of erection, and the substructure for the engine-house is being excavated. Good progress is also being made with the dredging of the foreshore. The contract for the pumping installation was placed with the Worthington Pump Co., Ltd., and the engines, of Diesel pattern, are being built by Carels Freres, Ghent. There will be five sets of centrifugal pumps, with discharge pipes 54 inches diameter, and the engines will make 180 revolutions per minute. The duty required of the pumps is to empty the dock of the whole of its contents, amounting to seven million cubic feet of water on an 18 ft. tide, in 2½ hours.

OIL FUEL.

AT a recent meeting of the American Society of Mechanical Engineers in San Francisco, the subject of oil burning was discussed very fully, ten papers being read upon the subject and some twenty engineers entering into the discussion. It is interesting to note the great stress laid upon the matter of reducing the excess of air to a minimum. In general, any burner will atomise the oil if sufficient steam is applied to it. On the basis of an equivalent evaporation of 15 pounds of water per pound of oil, steam for atomising equal to 5 per cent. of that generated would be equivalent to $15 \times 0.05 = 0.75$ lb. of steam per pound of oil fired, and similarly for other percentages.

In the tests made by the United States Naval Liquid Fuel Board in 1904 the steam required for atomising varied from 1.75 per cent. to 10.81 per cent. of the total generated. In these tests a large number of different burners were used. Average good practice seems to be in the neighborhood of 3.5 per cent. to 4 per cent. for atomising, although the best practice ranges from 1.5 per cent. to 3 per cent. At the Redondo plant in California the average steam for atomising in seven tests was 2.15 per cent. of the total generated. It should be said that the steam used for this purpose will vary greatly with the same burner.

H.M. AUSTRALIAN CRUISER "MELBOURNE."

THE launch of the cruiser Melbourne at Cammell, Laird & Co.'s works at Birkenhead on the 30th ult, has special signifiance, as it marks a new and definite naval policy undertaken by one of the Dominions of the Crown. The new Australasian navy, of which the Melbourne will form part, will comprise modern cruisers, torpedo boats, and submarines. It will further necessitate the maintenance by this colony of training establishments, dockyards, and factories.

The Melbourne, designed by Sir Philip Watts, Chief Constructor of the Navy; is 456 feet 10 inches long overall, 430 feet between perpendiculars, and 49 feet 10 inches in breadth, and her displacement at load draught, is about 5,600 tons. She will carry eight 6-inch guns, two broadside torpedo tubes, and will have a storage capacity for seven torpedoes. Protection is afforded to the water line and the hull above this line by an armor belt extending the whole length of the ship. The thickness of this belt is 2 inches amidships. Further protection of the vital machinery is afforded by the coal bunkers. The inner bottom is continuous throughout the magazine, machinery and shell room spaces, and the hull is divided transversely and longitudinally with watertight bulkheads.

The vessel will be propelled by steam turbines of the Parsons type, arranged to drive four shafts, each of the shafts being available for going either ahead or astern. The designed revolutions when the machinery is developing full power will be about 500 per minute. The condensers are of the Uniflux type, and are designed for the high vacua necessary with turbine machinery. The water-tube boilers are of the three-drum small tube type, the tubes being 1 1-8 in. and 1 3-8 in. diameter. The boilers are primarily intended for burning coal, but special arrangements have been made to enable oil fuel to be burned in conjunction with coal when this is neccessary. Many improvements have been made in the machinery as a result of the experience which has been gained in previous vessels of the class. The whole of the steel forgings in connection with the turbine machinery have been manufactured at the shipbuilders' steel works at Sheffield.

The ship is electrically lighted throughout internally by incandescent lamps, and arc lamps for use when coaling, have been provided. For coaling purposes, two electrically driven coaling winches will be used. They are capable of lifting one ton to a height of 40 feet at speeds varying from 75 feet to 200 feet per minute. The ammunition hoists, the ash hoists, and the after capstan are all electrically driven. The forward capstan placed on forecastle deck can be worked by steam or by hand. The officers are berthed aft on the lower deck and on the starboard side of the upper deck. The crew occupy the forward portions of these decks. Ten electrically driven 12-inch fans will supply air to the magazines, shell rooms, steering compartment, engineers' workshop, and working spaces beneath the lower deck, and also to the cabin and crew spaces, etc. The engine-rooms will be closed down in action and ventilated entirely by 20-inch and 25-inch electric fans.

Electrically driven reciprocating pumps with auxiliary hand gear for drawing water from the sea and delivering it to a sanitary tank, also for the distribution of fresh water to the various apartments, are part of the equipment. The steering gear, which is of the screw pattern, is worked by steam or hand, and is controlled from the bridge by telemotor gear. The wireless telegraphy installation is according to the latest Admiralty requirements. There are four searchlights placed in suitable positions and a comprehensive arrangement of voice pipes, telegraphs, and telephones. The ship will be manned by about 400 officers and men.

Allan Line.—The Allan Line s.s. Scandinavian, formerly the Romantic, of the White Star Line, arrived at Montreal, May 14, on her maiden trip to a Canadian port. Her dimensions are—length 550 ft., breadth 93 ft., depth 59 ft., registered tonnage 12,000. Her engines are of the reciprecating type, driving twin screws.

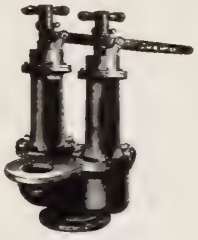
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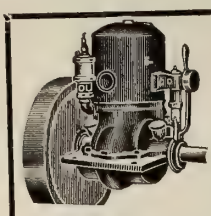
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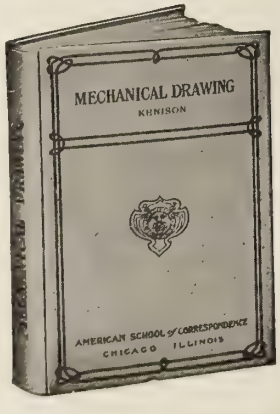
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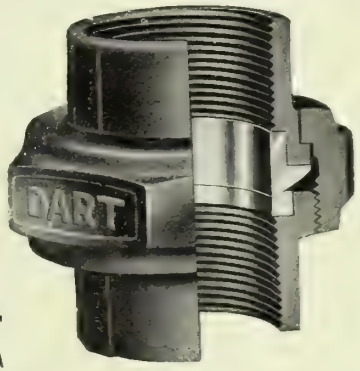
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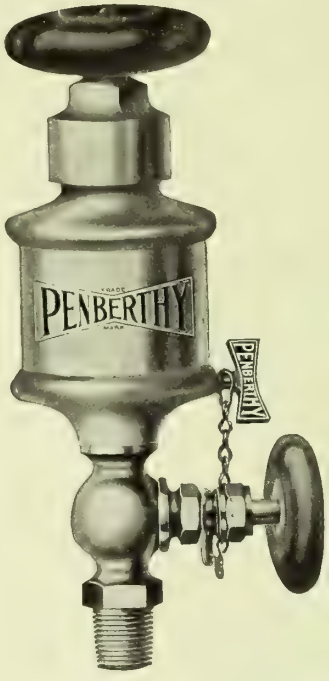
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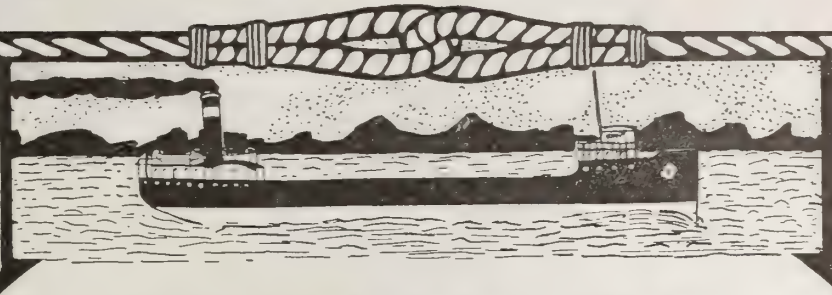
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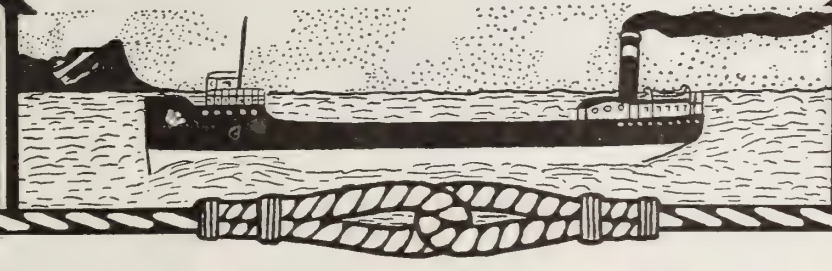
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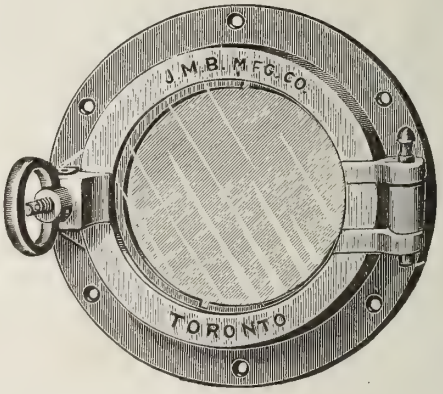
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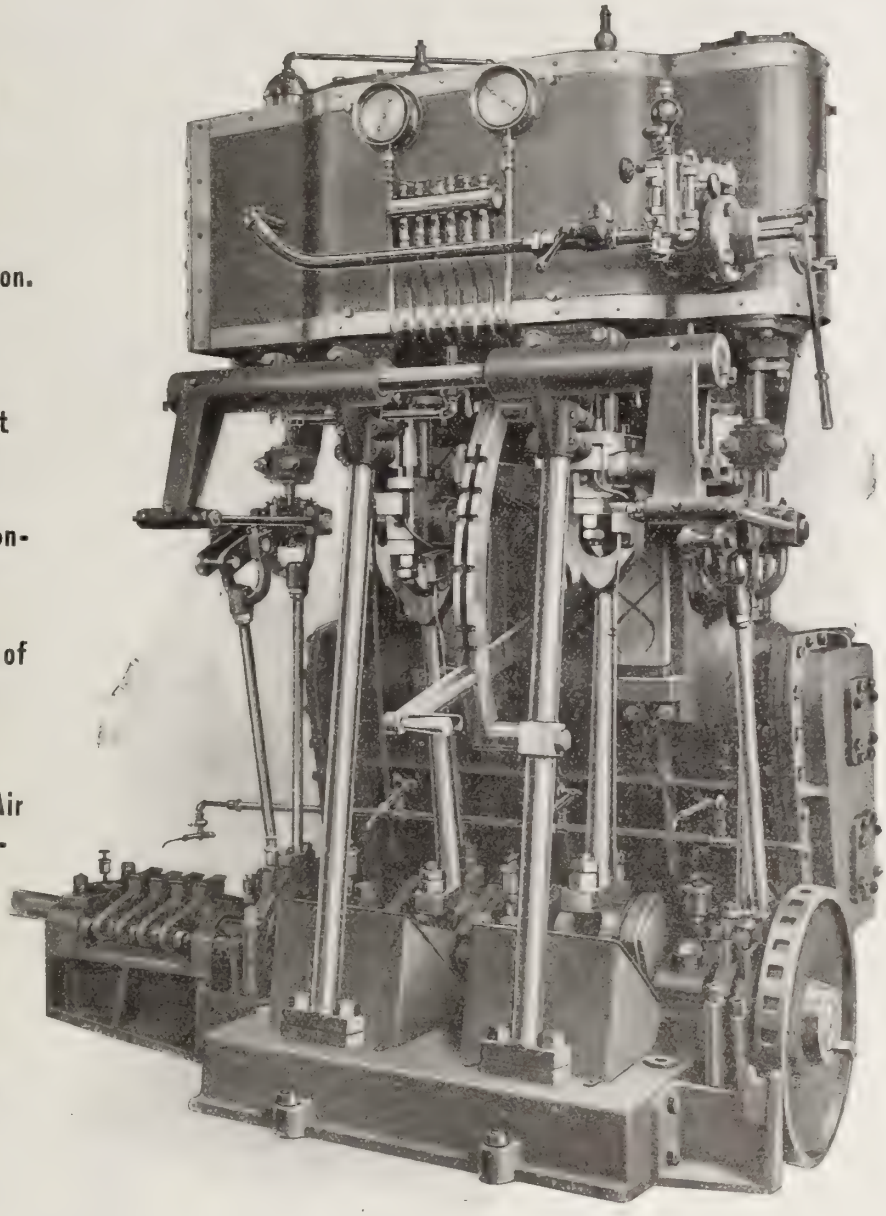
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The advertiser would like to know where you saw his advertisement—tell him.

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33 STEEL VESSELS

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By order of the District Court of the United States, Eastern Division of the Northern District of Ohio.

The Steel Fleet of The Gilchrist Transportation Co., sub-divided into fleets as described.

Bids for any or all fleets solicited subject to previously accepted bids. The acceptance of any bid conditioned upon the approval of the Court.

	Length Keel Feet.	Beam. Feet.	Carrying Capacity Tons.	No. Compartments	
Fleet No. 1—					
STEAMERS—					
F. W. Gilchrist	416	50	7,000	4	
J. L. Weeks	416	50	7,000	4	
P. G. Walker	416	50	7,000	4	
J. C. Gilchrist	416	50	7,000	4	
R. E. Schuck	416	50	7,000	4	
R. L. Ireland	416	50	7,000	4	
H. S. Sill	416	50	7,000	4	
L. Woodruff	416	50	7,000	4	
Fleet No. 2—					
F. J. Hecker	464	50	8,000	4	
G. H. Russel	464	50	8,000	4	
Fleet No. 3—					
John Sherwin	514	54	10,000	4	
Jas. B. Wood	514	54	10,000	4	
Fleet No. 4—					
Gilchrist	356	50	6,000	3	
Fleet No. 5—					
G. A. Garretson	520	54	10,000	4	
H. P. McIntosh	520	54	10,000	4	
Fleet No. 6—					
Lake Shore	356	50	6,000	3	
Fleet No. 7—					
Jupiter	346	48	5,500	3	
Venus	346	48	5,500	3	
Saturn	346	48	5,500	3	
Uranus	346	48	5,500	3	
Mars	346	48	5,500	3	
Neptune	346	48	5,500	3	
Fleet No. 8—					
F. M. Osborne	380	50	6,500	4	
Frank W. Hart	380	50	6,500	4	
Steel King	380	50	6,500	4	
E. N. Saunders	380	50	6,500	4	
C. W. Watson	380	50	6,500	4	
Fleet No. 9—					
D. M. Whitney	412*	51*	7,000	4	
E. W. Oglebay	375	45*	5,000	3	
Merida	360	45	5,000	3	
Fleet No. 10—					
Vulcan	260	38	2,800	3	*23-24ths.
Thos. Maytham	286	41	3,600	1	*23-36ths.
Tow Barge Tyrone	300*	41	4,000	3	

*Interest of The Gilchrist Transportation Co.

Any further information desired can be obtained by addressing

G. A. Garretson, S. P. Shane, Receivers, 1415 Rockefeller Building, CLEVELAND, Ohio

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Marine Department of the Grand Trunk Pacific Railway Co.

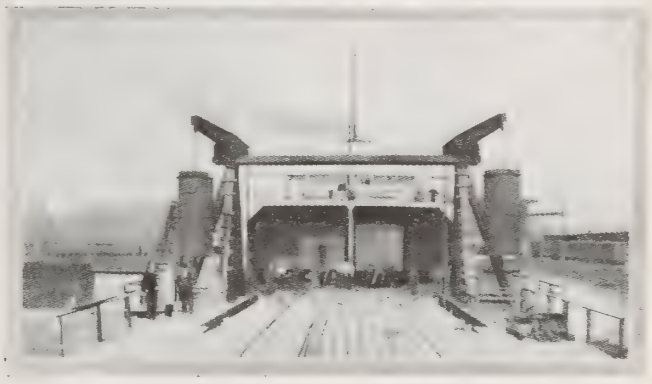
By Capstan

The progress towards completion of Canada's second Transcontinental Railroad marks an increased interest being taken in the establishment of regular and first-class steamship services at its ocean terminals, lake and river ports. As will be seen from the accompanying illustrations and description, the G.T.P. is keeping abreast of the times in matters marine.

WITH the rapid extension of its continent-wide system the Grand Trunk Railway Co. has experienced the need of entering actively into the field of transportation by water as well as by land. True, there are at present no Trans-Atlantic or Trans-Pacific vessels flying the Grand Trunk flag, but this is only because the time is not yet ripe for such a venture. Mr. E. J. Chamberlin, the President, has within the last few weeks, promised that when the Transcontinental line is completed and in full operation, such a fleet of vessels will ply the waters of both oceans, carrying the freight and passenger traffic of the company to and from the Old World and the Far East. Few people, however, probably realize the extent of Grand Trunk activities in a marine direction at the present time.



FREIGHT CARS BEING RUN ABOARD THE G.T.R. FERRY STEAMER "MILWAUKEE."



G.T.R. FERRY STEAMER READY TO SAIL.

On both the Atlantic and Pacific Coasts, as well as on the inland waters of the Great Lakes, there are strong and efficient fleets of ships either the property of the Grand Trunk or belonging to affiliated companies. First in importance is the North Pacific Coast Service with the Company's steamships "Prince Rupert" and "Prince George," maintaining a service from Seattle, through Victoria and Vancouver to Prince Rupert, the western terminus of



GRAND TRUNK RAILWAY SYSTEM CAR FERRY "ONTARIO NO. 1."

the Grand Trunk Pacific Railway. These beautifully designed and graceful steamers are among the largest and fastest vessels of the western coast. In addition to their being handsome in their outside appearance, the whole scheme of interior decoration and ornamentation has been most carefully considered and artistically carried out by the builders, Messrs. Swan, Hunter & Wigham Richardsos, Limited, Wallsend-on-Tine, England.



GRAND TRUNK PACIFIC STEAMSHIP "PRINCE RUPERT."

The general dimensions of these vessels are:

Length over all, 320 ft.
Breadth, extreme, 42 ft. 1¾ inches.
Depth moulded to shelter deck, 26 ft.
Gross tonnage, 3,380 tons
Deadweight carrying capacity, 1,100 tons.
Water ballast, 660 tons.

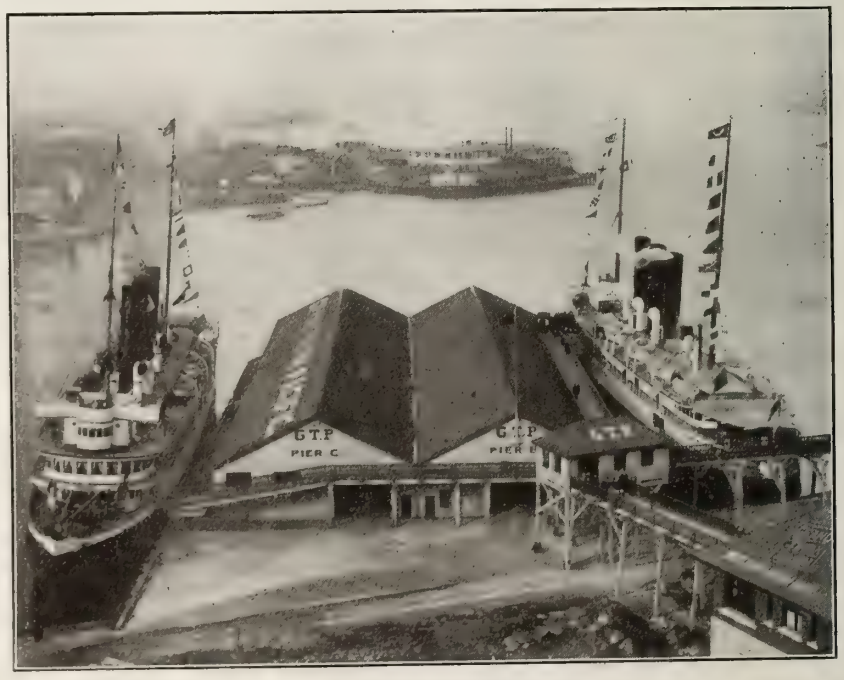
The propelling machinery consists of twin-screw, triple expansion engines with four cylinders, having cranks balanced on the Yarrow-Schlick and Tweedy system to ensure smooth running without vibration. The indicated horsepower is about 7,000, and the speed 18½ knots per hour, loaded. Passenger accommodation is provided for 220 first-class and 132 second-class, while promenade space is available for about 1,500 excursionists. The crew numbers 84. The vessels, rigged as two masted fore and aft schooners have three funnels, and their straight stem and rounded cruiser stern give them a smart and graceful appearance in addition to affording increased deck room for promenade and general accommodation.

Atlantic Coast and Great Lakes

Only recently two new steamers have been ordered and will, when completed, enter on a service between the ports of Providence and New York, thus establishing coast facilities on the Atlantic. The Canada Atlantic Transit Co., affiliated with the railroad and familiarly known as the "Cat Line," has a fleet of four freight ships, with a combined tonnage of 18,500 tons, which runs from Depot Harbor in Ontario to Milwaukee and Chicago. This route has steadily grown in favor with British and European patrons of the G.T.R. System for the handling of grain and other products, particularly as it affords cheap and expeditious facilities for distribution.

The Lake Superior Fleet comprises the "Saronic," "Huronic" and "Hy-monic," the latter conceded to be the largest, finest and fastest steamer of her class on the Great Lakes. Her dimensions are:—Length, 365 feet; beam, 50 feet; depth (moulded) 27 feet; gross tonnage, 5,000 tons; cargo, 3,000 tons; passenger accommodation, 400 first-class and 75 second-class. She carries 110 of a crew. These splendid passenger ships are widely and popularly known to the travelling public, and the Company, in accordance with its traditions and policy, keeps on improving its service and adding to the facilities for the comfort, pleasure and convenience of its patrons with each succeeding year. While possessing a just pride in its steamers, the Company is especially proud of its dining room service with its noon-day luncheon and evening dinner served by a full staff of uniformed colored waiters. Orchestras are carried through the tourist season, furnishing music during luncheon and dinner as well as for dancing and the entertainment of the passengers in the Observation Room and Sun Parlors in the evenings. The officers are all experienced men trained in the Company's service and as well as being capable and tried seamen, are especially versed in the discipline and duties pertaining to large passenger steamers.

There is now building for the Lake Superior Service the largest and best appointed passenger ship of Upper Lake design yet planned for fresh water service anywhere in the world. This magnificent vessel will compare favorably with Ocean Liners in size and appointments. Her dimensions are:—Length, 385 feet; beam, 52 feet; depth (molded) 29 feet; gross tonnage, 6,100 tons; cargo, 3,500 tons; speed, 19 miles per hour; passenger accommodation, 600 first-class, 75 second-class,, with a crew of 165. The



GRAND TRUNK PACIFIC STEAMSHIPS "PRINCE RUPERT" AND "PRINCE GEORGE." AT THEIR WHARVES.

first-class dining room will seat 300 passengers.

The service on the Georgian Bay and Mackinac Route comprises the well-known and popular steamers "Majestic," "Germanic" and "City of Midland," with their large and airy staterooms all supplied with running water and electric bells, beautiful saloons and splendid observation rooms on the upper decks, enabling passengers to enjoy the entrancing scenery of this region in the midst of ease and luxury.



THE LATE C. M. HAYS, PRESIDENT THE G.T.R. AND G.T.P. RAILROAD AND STEAMSHIP CO.

Car Ferry Service.

In addition to the above fleets, the Grand Trunk operates car ferry services between Cobourg and Rochester, Windsor and Detroit, Grand Haven and Milwaukee, respectively. The car ferry "Ontario No. 1" makes regular trips the year round between Cobourg, Ont., and the Port of Rochester, N.Y., a distance across Lake Ontario of 56 miles. This vessel is one of the largest boats plying on the lakes. Her length over all is 316 feet, beam 54 feet, depth of hull 20 feet. She draws 15 feet of water and is among the most powerful vessels on the Great Lakes. She is built of steel, with water-tight bulkheads, and is propelled by twin screws driven by powerful engines, which give her a speed of 17 knots an hour. Under the main passenger deck is a miniature freight yard with four sidings, having a capacity of 30 ordinary freight cars or 30 coal cars carrying a load of 50 tons each. The shipping public is thus afforded, via the car ferry "Ontario No. 1," a short connection for the carriage of freight between points in Eastern Ontario and the Province of Quebec, and the populous district in the United States, south of Lake Ontario, tributary to the lines of the Buffalo, Rochester and Pittsburg Railway and its various connections.

Across the Detroit River, a distance of about half a mile, a car ferry is operated by the Grand Trunk Railway System to carry their trains, both freight and passenger, and acts as a link to join the eastern divisions of the railroad with their lines running west of Detroit and St. Clair Rivers. The business between these two points is very heavy, and the service is operated by three large steamers. The "Lansdowne," which is 319 feet 5 inches long, has a breadth of hull 41 feet 6 inches, a depth of hull of 15 feet, and a carrying capacity of 16 thirty-six feet freight cars or 8 standard passenger cars each 72 feet long.

The "Huron" is 240 feet long, with a breadth of hull of 44 feet 2 inches and a depth of hull of 15 feet. Her carrying capacity is the same as the "Lansdowne."

The "Great Western" is a little smaller than the other two, being 237 feet long, with a breadth of hull of 41 feet and a depth of hull of 12 feet 10 inches. Her carrying capacity is 12 freight cars each 36 feet long, or 6 standard passenger cars each 72 feet long.

The ferries used for the transportation of freight cars and passenger cars across Lake Michigan between Grand Haven and Milwaukee are the largest of any car ferries in operation in America. The service is being taken care of by the two vessels "Milwaukee" and "Grand Haven." The "Milwaukee" is 350 feet long, has a breadth of beam of 56 feet, depth of hull 19 feet 6 inches, and a draft of 11 feet 3 inches. She is not quite as fast as the "Grand Haven," but when loaded makes about 16 miles per hour. Her engines are 3,000 horse power, and her carrying capacity 30 loaded freight cars of 60 tons each. There are 30 state rooms, her certificate enabling 90 first-class and 60 second-class passengers to be carried. The gross tonnage of the "Milwaukee" is 2,933 tons.

The "Grand Haven" has a length of 320 feet over all, breadth of beam 54 feet 4 inches, and a depth of hull of 17 feet 3 inches. Her draught when loaded is 11 feet 10 inches and her speed about 20 miles per hour. Her engines have a capacity of 4,000 horse power, while her freight carrying capacity is 28 freight cars of 60 tons each. The passenger accommodation consists of 32 state rooms, being provision for 96 first-class and 154 second-class passengers. The freight service inaugurated by this "across lake" route affords the shipping public favorable freight rates and a superior service.

THE POLSON IRON WORKS, LTD., TORONTO.

THE Polson Ironworks, Toronto have recently booked the following orders:

One single screw steel tug for the Canadian Department of Public Works; length over all, 80 ft.; beam molded, 20 ft.; depth molded, 10 ft,; and draft aft., 10 ft. The engines, inverted vertical compound surface condensing, having cylinders 12 and 26 inches diameter by 18 inches stroke, will be supplied with steam at a working pressure of 145 pounds per sq. inch by a return-tubular Scotch marine type boiler, 10 ft. diameter and 11 ft. long. The general machinery equipment will consist of an electric light installation, search light, steam steering gear, steam windlass, etc.

One steel, single screw, ice-breaking tug for the Canadian Government Department of Railways and Canals; length over all, 80 ft.; beam molded, 20ft; depth, 8 ft. 7½ inches. The engines of the vertical inverted high pressure type with single cylinder, 12 inches diameter by 14 inches stroke, will be supplied with steam at 150 pounds per sq. inch working pressure by a return tubular Scotch marine type boiler, 7 ft. diameter and 9 ft. long.

One steel drill boat for John E. Russell, contractor, Toronto; length over all, 80 ft.; beam, 30 ft.; depth, 6 ft. The hull and boiler, only the latter of the watertight type, constructed for a working pressure of 150 pounds per sq. inch, are being supplied on the order; the drills being purchased elsewhere.

ICE-BREAKING STEAMER "PJOTR WELIKIJ."

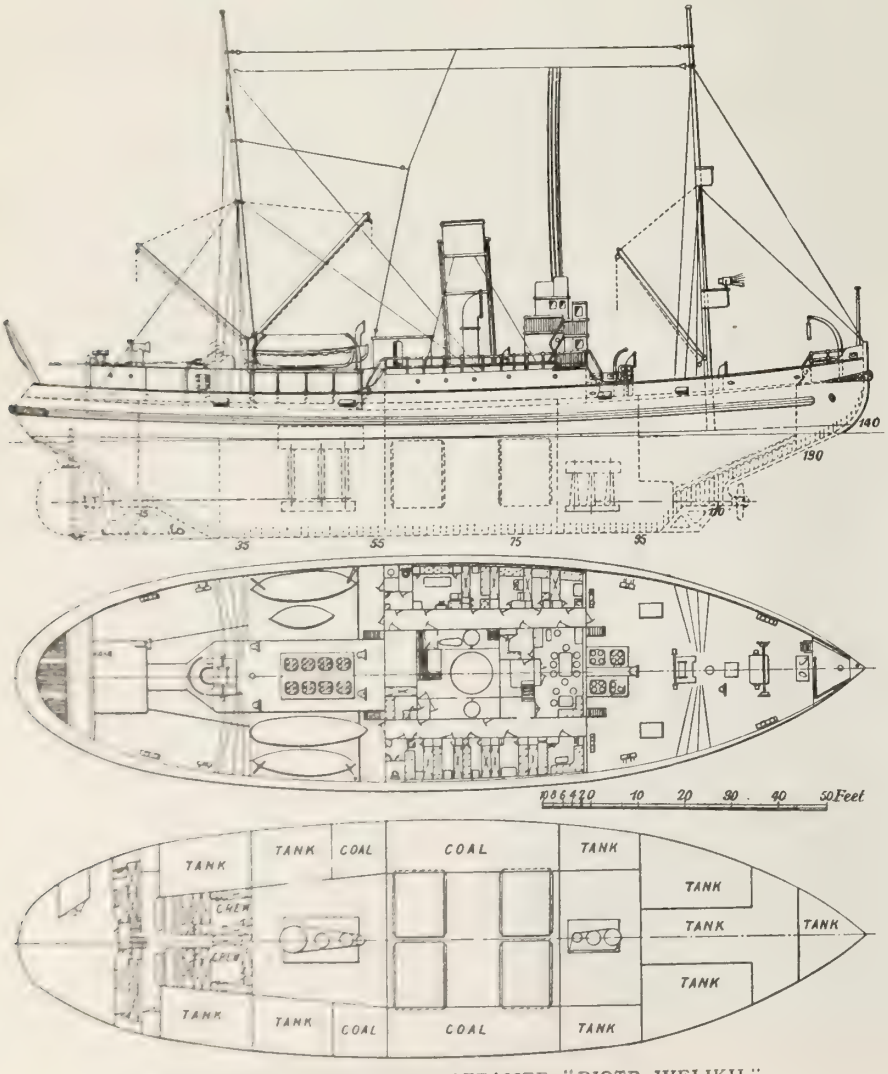
WE describe and illustrate a powerful ice-breaking steamer recently constructed by the Goteborgs Nya Verkstadsaktiebolag, Gotaverken, Gothenburg Sweden to the order of the Rigaer Borsenkomite, the contract time of delivery being specified at 10½ months. The design of the boat was novel, and possessed several difficult technical problems, but these were met with vigor, and the work was pushed forward so energetically that the vessel was launched on November 21 last and delivered early in February this year. The design was worked out by the technical staff of Gotaberken on lines laid down by the chief engineer of the Rigaer Borsenkomite, Mr. Oscar Fleischer, and Professor Ch. Clark, of Rigaer Polytechnicum, who together with Captain Melville and Messrs. Johnson and Erdtman, of Gothenburg also supervised the building of the steamer.

Vessel Particulars.

The dimensions of the boat are the following:—Length over all, 182 ft. 1 in.; length, C.W.L. 170 ft. 7 in.; maximum breadth, 50 ft. 10 in.; breadth, W. L., 48 ft. 7 in.; molded depth, 27 ft. 5 in.; draught, 21 ft. 4 in. displacement, 1900 tons. A good idea of the appearance of the vessel is given by fig. 1, which is reproduced from a photograph of the boat under steam. Figs 2, 3, and 4 are respectively a side elevation, a deck plan, and a plan showing the arrangement of the engines and boilers. It will be noticed that there is a propeller at each end of the vessel, each having its own engines; the engines at the fore end being the smaller of the two.



FIG. 1—ICE-BREAKING STEAMER "PJOTR WELIKIJ."



FIGS. 2, 3, 4— ICE-BREAKING STEAMER "PJOTR WELIKIJ."

The leading dimensions of the engines, which have each three cylinders, are as follows, taking the aft engine first:—Diameter of cylinders, 22 7-16 in., 35 7-16 in., and 59 1-16 in., the stroke being 39⅜ in. The maximum horsepower of the engines is 2,500. The dimensions of the forward engines are:—Diameter of cylinders, 15 15-16 in., 25⅝ in., and 41⅜ in. respectively, the maximum horse-power being 1,200. There are four boilers, each having a diameter of 14 ft. 6 in. and a length of 8 ft.

On account of the very unusual proportions of the vessel, especially the great breadth and depth relatively to the length, the speed was a difficult question to settle, but was agreed upon as 12½ knots, which was easily surpassed by 2 knots at the trials, the depth of water on the course being 50 ft. This appears to indicate that the lines are as suitable for speed as for ice-breaking. There is in fact, a certain resemblance to a sailing yacht in the shape of the hull. The vessel is rather sharp; all flat parts being avoided in the underwater body, as these only increase the danger of the boat getting stuck in the ice. A notable feature of the design is the size of the ballast-tanks for trimming the boat in all directions and thereby freeing it in heavy ice. As much as 350 tons of water can be shifted in less than ten minutes by two "Gotaverkens" marine pumps, each of 1,200 tons capacity per hour. On the forward propeller shaft there is a Benn coupling, which serves to throw out the propeller automatically in case the blades strike an unusually large piece of ice.

All the cast steel and forgings in the hull and machinery are of the best Swedish quality. The steering gear,

which was made by Bevan Bros., is located aft with telemotor transmission. There are a windlass and a cargo hoist of Clark Chapman type, and also a large winch aft, made by Robert Rodger & Co., Limited. The outfit is all complete, including salvage arrangements, and motor boat fitted with a "Skandia" motor. The vessel is provided with a wireless telegraph installation, made and fitted by the Swedish A.E.G. Company, and manufactured in Stockholm. The four boilers are fitted with superheaters, and are worked with forced draught.

The steam and speed trials were successfully completed in a few days at Gothenburg, and the ice trials were made during the trip to Riga. The report of the commission says:—"Ice-packs of 25 ft. to 30 ft. thickness were dispersed by trimming the ship and through the work of the forward propeller in such a way that the ice-breaker could go through with only half-power. The ice-breaker has passed the contract trials, which show that the builders have not only fulfilled all demands of the contract, but even exceeded the same in the main points. The total horse power was 4,000 instead of 3,500, and the speed 14.5 knots instead of 12.5.—Engineering.

"LA CANADIENNE" INQUIRY.

WRECK Commissioner Lindsay arrived from Ottawa July 3, and opened an investigation at Port Dalhousie into the cause of the sinking of the Government Hydrographical Survey Ship "La Canadienne," in Lock 22, some time ago. Evidence was taken from a number of witnesses.

The testimony given was much the same as that adduced at the coroner's inquest. Captain Lindsay interrogated the witnesses directly, and John S. Campbell appeared in the interests of Captain Brown. Captain Brown again told his story of the accident, and said he had held a certificate as master of an inland ship sixteen years. He had commanded "La Canadienne" since May 1. He told that at lock 1 and at almost every other lock, he had had trouble with Thomas Richmond, a deckhand, who had charge of snubbing the line which refused to hold. At lock 1, he said Richmond had allowed the line to surge, with the result that the boat came up against the head gates, but no damage resulted. Also at lock 7, he said Richmond was careless. He gave orders before the boat entered lock 22 for half speed, then he gave the order for full astern, but the boat simply went much faster. It had just opened the head gates six inches. The captain admitted having had trouble while in the Lachine Canal; the engines refused to stop, and afterwards when an attempt was made to start them they would not go at all.

Thomas Richmond, a deckhand said the vessel was traveling too fast to get turns of the rope on the timbers. He hung on to the rope with difficulty until the vessel struck the gates. When he saw the speed at which the boat was traveling he realized an accident could not be averted, and told his companion so. William Cosgrove, engineer, stated that the vesesel's propeller was antiquated and had no doubt the vessel would be much safer if a modern wheel was installed.

Captain Lindsay will consider the evidence and give his finding at an early date.

AMERICAN SHIPBUILDING.

THE following information is from the report by H.M. Consul-General at Boston (Mr. F. P. Leay) on the trade of that district in 1911. The report will shortly be issued:—The decline of the shipbuilding industry in the United States during the past five years—viz., 17 per cent. in value of materials, 14 per cent. in the aggregate wages paid, and 20 per cent. in the number of men employed, is frequently commented on in Massachusetts. The cause is generally held to be high wages and high cost of construction, combined with absence of incentive due to unrestricted competition in ocean traffic.

Maine's shipbuilding record in 1911 emphasizes the decline of that once great industry; the entire output of the State, including all sorts of craft of all sizes, falling below 10,000 tons, whereas in times past the new tonnage ranged from 30,000 to 40,000, and occasionally reached as high as 60,000 or 70,000 tons.

ATLANTIC PORT ON LABRADOR COAST.

STILL another port is suggested as the best possible for the terminals of the proposed fast steamship line between Canada and Great Britain. This is Cape St. Charles, on the Labrador coast, and its champion is Sir Rodolphe Forget, who has hopes of extending the Quebec & Saguenay Railway, now building along the north shore to that point. Sir Rodolphe, who recently entertained Mr. Foster, a representative of the European capitalists who are financing the Quebec & Saguenay Railway, is strong in his claims for Cape St. Charles as a coming port. The harbor is situated at the mouth of the St. Charles River, and is open all the year round. It is just opposite the Belle Isle Straits, and is only 1,682 miles from Liverpool, which, Sir Rodolphe points out is little more than half the distance between Liverpool and New York.

THE ARCH PRINCIPLE OF HULL CONSTRUCTION.

THE arch principle of construction under the Ayre-Ballard patents consists of a transverse arch over and above the normal hull, and forming an integral part of the same. This juncture of the arch sides or abutments at the upper and lower corners, form, in association with the other structure, rigid terminations of the vertical and horizontal spans of the transverse girders. The arches are blended into the vertical structure of the vessel by means of arch brackets and reverse frames, which bind the whole together in a most efficient and structurally sound manner.

From the foregoing brief description, it will be observed that in the Ayre-Ballard design an attempt has been made to utilize the natural strength due to form more than in the ordinary vessel. In other words, it is claimed that an increase in the size of the vessel has been made with a less total girth of material than hitherto employed, and herein lies the saving which is the primary commercial inducement offered by the type to shipowners. The Edenor, built on this plan, has proved herself a highly successful and a very strong vessel.

U.S. COMMERCIAL ENTERPRISE.

Commercial enterprise has constantly been the foreword of American progress. The Panama canal, conceived and now practically executed under the impulse toward extended markets, promises likewise to be a strong agency in a patriotic direction. With the upbuilding of shipping enterprise should come, in considerable measure, the re-establishment of the American Merchant Marine and the re-appearance of the American flag in many ports from which it has been almost wholly missing in recent years. If the Panama canal will help to re-establish the force of an auxiliary craft under the American flag and to refill the depleted ranks of a trained seamanship, invaluable as a protective support in time of stress, it will have served the nation even better than some of its originators may have foreseen. It should prove a boon to those who have been laboring with energy and patriotism in the hope of stirring the appreciation of the American people, to the dangers lurking with the absence of a proper merchant marine and to the measures calculated to correct the peril of such deficiency.—I. T. Review.



PACIFIC COAST LETTER.

By George Bulkeley, A.M.I. Mech. E.

MARINE business, that is marine business large enough to be of interest to the readers of your paper, is pretty slack this month, so I am giving you some idea of how marine engineering matters stand on the B.C. coast, and what strikes me as our urgent needs in this direction.

Shipbuilding is, at present, almost entirely confined to wood constructed vessels, i.e., yachts, launches and fishery craft, ranging from the little 18-footer to the 100-foot vessel. It is true, that periodically, one of the steel ship-building and repairing yards here turn out a small steel towboat, or what not—the B. C. Marine Railways have now an order for a fair sized steel vessel for the C.P.R. coastwise service; but, owing to the cost of materials, to the wages demanded by the workmen's unions, and last but by no means least, to the overmastering difficult of getting highly skilled shipwrights—and when they have been got, of keeping them through a long job, steel shipbuilding on this coast cannot, as yet, hope to compete in price with vessels built in Great Britain. A notable instance of this is the case of the 100-foot steel whaling steamers which the whaling companies import, under their own power, from Norway. The cost of bringing these craft out is some $6,000, but, even with this handicap against their being built abroad in favor of B.C. shipbuilders, the writer understands that they cannot be built and engined in B.C. at a competitive price.

As an example of what B.C. is losing in the shipbuilding line through the above mentioned existing conditions may be mentioned the new steel vessel for the Department of Marine and Fisheries which has actually been designed, built and engined on the great lakes, and is to be shipped out to this coast under her own power, traveling across the Atlantic, Mediterranean, Indian Ocean and Pacific in order to get to the scene of her ultimate work. It would seem that something has got to happen, and happen very soon, to enable the cost of steel shipbuilding on this Western Coast of Canada, to compete, in some measure, with the combined costs of both building ships in Europe or Eastern Canada, and running them out here under their own power. We are expecting, and rightly, great things of the opening of the Panama Canal; but if our steel shipbuilding in B.C. keeps up in cost, we shall still have to import new vessels for the increased coastwise trade we expect. We have also got to see to it that the charges for drydocking and steamship repairs at B.C. ports do not exceed those at American ports, or we shall not reap our share of the harvest of the sea which the Panama Canal will pour into the Pacific.

Establishment of Factories.

What the Pacific Coast of Canada needs is industries and factories. With iron ore and coal at our doors and the the certain promise of a great amount of shipbuilding and repairing offering in a very few years' time—what is hindering capitalists from investing in that which bids fair to be (in conjunction with that other great B.C. maritime trade, the halibut, salmon and herring fisheries), the Pacific Coast premier industry? We are woefully behindhand in developing our maritime resources here. A maritime province in every sense of the word, yet without the maritime spirit. H.M.C.G.S. "Rainbow" offers opportunities for healthy lads to become members of the Empire's senior service, the Navy; but where are her recruits ? The Navy League, with splendid generosity, has purchased H.M. S. "Egeria" to be a training ship for youths wishing to enter the mercantile marine; but she is sadly empty.

The spirit of home enterprise and of home commercial expansion we have, and have abundantly; but the spirit of enterprise in connection with overseas commerce, which first shows itself by a burning desire in the breast of a lad to sail the seas to foreign lands, and which afterwards steadies down to a lively interest and appreciation of what the sea and ocean-borne trade mean to the Empire to which he belongs—this spirit seems sadly lacking in the make-up of British Columbians (or is it only dormant?) and thought is forced upon one that were Captain Vancouver or Sir Francis Drake to put into port here now, with a cry for men to sail with them to new lands, and for merchants to open up new and profitable avenues of overseas commerce to the material advantage of B.C.—they would stand little chance of getting either crew or passengers from Vancouver or Victoria. We have got to shake off this apathy to matters of marine interest and importance in this province. If it was "Wake up England," it is every bit as much "Wake up B.C. to your maritime position in the world's trade."

It is an easy thing for a capitalist to say, "I will put my money into real estate, and, by judicious manipulation, double it, retire, and live at leisure." What B.C. wants is public-spirited men of capital and influence, who, whilst legitimately desirous of obtaining good returns from wise investment of their money, will yet be willing to assist the advancement of the country in which they live, to the extent of financing factories and industries, which will (not only during their lives, but after their decease) continue to add to the general material prosperity, and will, by the employment of skilled labor and permanent operating staffs, enable British Columbia to develop her magnificent natural geographical position as the centre of the British Empire. It is a thing most to be desired that B.C. shall soon be in a position to manufacture herself what she needs in the way of ships for her maritime trade in her own shipyards, and, when launched, to man them with her own native sons; for it is a safe prophecy to predict that, once the Pacific Coast of Canada has a maritime population actively engaged in shipbuilding and fishery work, the sterling stuff of which B.C. lads are made will at once respond to the ever magic cry of "Westward Ho!"

I do not know if any of this will be of sufficient interest to incorporate in an article in your paper; but capitalists and public men most surely require to be brought to see more clearly what B.C.'s maritime interests are, and how

they offer both a field for profitable investment and an opportunity to add to the already wonderful prosperity of the province. Again, with all their loud, protested patriotism to British Columbia, we find, right now, men who have made their money in B.C. real estate, spending it in having their pleasure yachts built by Chinese labor in Hong Kong, and shipped by freight vessel from there to Vancouver, instead of encouraging the local shipyards in the province from which their wealth has been derived.

Editor's Note.—Regarding the steel vessel built at Collingwood on the Great Lakes for the Department of Marine and Fisheries, we are under the impression that it is intended to take her to the Pacific Coast via Cape Horn, and not as suggested in the foregoing.)

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C.P.R. STEAMSHIP "PRINCESS SOPHIA."

SUCCESS attended the initial trip of the new C.P.R. steamer Princess Sophia, Capt. Campbell, to Prince Rupert and Skagway. The vessel came in to port after having completed a trip on which she surpassed all the expectations of the officials of the B.C. Coast Service. Her speed was doubted but she proved that she can give any of the smaller Princesses a hard run. Owing to the large amount of freight offered in Vancouver she was twelve hours late in getting away from there on her north bound trip but was back at her dock in the Terminal City several hours ahead of time.

Princess Sophia on her run south from Prince Rupert passed thrice the steamer Humboldt, of the Humboldt Steamship Company, which is one of the fastest American ships operating to the north. Shortly after leaving the northern port, the Sophia sighted the Humboldt, and proceeded to overhaul her. The Humboldt made a determined effort to keep ahead, but was at last forced to give in. When the Sophia called at Swanson Bay the Humboldt sped by, but the Sophia once again overhauled her. Upon making another call, the Humboldt got in the lead again, but she did not hold it long, as the Sophia was right after her and caught her just before entering Seymour Narrows.

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VESSEL CHANGES HANDS.

ANOTHER steamship well-known in British Columbia water, the Indravelli of the Indra Line has passed from British to Japanese Registry. Only recently a deal was consummated whereby the vessel has completed her service under the Union Jack. A Japanese syndicate which has been buying considerable tonnage during the past year, has purchased the Indravelli and will use her in a steamship service which will shortly be inaugurated.

The Indra freighter is 4,828 tons gross and brought $145,000. She is now on a trip from New York to the Far East and will be turned over to her new owners upon her arrival in Japan. The Indravelli is of the shelter deck type, and was launched in 1897 from the yard of Messrs. C. Connell & Co., Glasgow. She is fitted with triple expansion engines, having cylinders 26 inches, 44 inches and 73 inches diameter by 48-inch stroke. Steam is provided by three single-ended boilers.

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C.P.R. STEAMSHIP "PRINCESS VICTORIA."

COMING within three minutes of her own record for the run between Seattle and Victoria, B.C., the C.P.R. steamer Princess Victoria, Capt. Hickey, arrived at the latter port recently after one of the fastest trips made across the Sound for a couple of years. From Four Mile Point, just outside Seattle, the spot where the full speed bell is rung, to Brotchie Ledge, the slowing down point, the Victoria took exactly three hours and two minutes. She bucked a head wind all the way across, but was assisted by a fair tide.

A couple of years ago the Princess established a record from Seattle to Victoria of two hours and fifty-nine minutes, which has so far never been eclipsed. The Princess Charlotte came near the mark once, but failed to show the speed of the Victoria. Since being equipped as an oil burner the old flyer has made several smart trips, but her recent run is the best of these.



C.P.R. PACIFIC COAST STEAMSHIP "PRINCESS VICTORIA."

DISCOVERY OF VANCOUVER.

A MOVEMENT has been started to honor the memory of Captain George Vancouver, the famous explorer, after whom the Island and City of Vancouver are named.

Captain Vancouver, who was an officer in the British Navy, made his memorable voyage of discovery in 1792, but no attempt was made to form a permanent settlement there until 1843, when the Hudson Bay Company built a fort and trading station. Captain Vancouver died in 1798, and was buried in the old parish graveyard at Petersham, Surrey. His grave is in a neglected condition, and the only indication of its existence is an insignificant stone. In Canada, up to the present, nothing has been done to erect either a statue or other monument to him.

The pupils of Welland Public School have subscribed towards the purchase of a Canadian ensign which has been sent to the pupils of the elementary school at Marton, Yorkshire, the birthplace of Captain James Cook, the famous navigator and discoverer. Last year the school children of Sydney, New South Wales, sent to the Marton School a handsome ensign of the Australian Commonwealth in honor of the great seaman whose discoveries and voyages in the Pacific did so much to extend and maintain the British Empire.

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C.P.R. LINER EMPRESS OF CHINA.

THE C.P.R. liner Empress of China has been sold to a firm of Japanese junk dealers for $65,000, according to news brought by the Monteagle. The probability is that the China will be broken up, but Purser E. Syder, of the Monteagle suggests the possibility of the liner being put in shape and operated on the Japanese coast.

The Empress of China was put up for auction, but the underwriters would not accept the bids, and intimated that the vessel might receive temporary repairs and be sent to England. This had the effect of moving the Japanese. The Empress of China commenced running from Vancouver to the Orient in 1891, and on July 27 last year she went ashore on the Awa Peninsula.

U. S. DREDGE "COROZAL."

THE main driving wheel gear on the port side of the new ladder dredge Corozal broke on the afternoon of Tuesday, June 4, putting the remainder of the machinery out of commission. The accident occurred while the dredge was excavating in a 25-foot bank, the upper part of which consisted of stratified clay, and the lower part of argillaceous sandstone. The wheel gear is a ponderous piece, made up of an outer wheel or cog rim, and an inner wheel, consisting of rim spokes and hub, which operates by means of a friction brake. The entire wheel gear is 14½ feet in diameter, two feet thick, and each section weighs close to 10 tons, making the combined weight about 20 tons. The dredge had to be taken to the Panama railroad wharf, and the wheel removed in sections by crane.

The accident was a peculiar one, and the first one of the kind on an Isthmian Canal Commission dredge, although it is recorded that a similar accident occurred on a Suez Canal dredge. Every one of the six huge iron spokes was broken short off, leaving the hub entirely free from the remainder of the gear. A new casting, made at Gorgona shops and machined at Empire, was ready for shipment on June 17. Another casting was ordered by cable from the builders of the dredge in Scotland, and is now on the way.

MARINE BOILER FAILURES.

IN a paper entitled "Further Notes on Marine Boiler Failures," read before the Liverpool Engineering Society recently, Mr. J. Renny Smith said, that in a paper read before the Society in 1904, an endeavor was made to show that the great source of boiler troubles, apart from failures due to neglect, was the distortion and alteration in form of the various parts, caused by unequal expansion and contraction. The result of longitudinal expansion was that as the front and back plates prevented an increase in the length, the furnace was compressed and the corrugations were closed; the effect being greater on the upper than on the lower part of the tube. Simultaneously, there was an increase in the vertical direction with a combined result that the furnace was flattened, the flattening being greatest at the combustion chamber end where the corrugations were exposed to the greatest heat, and where, in fact, the furnace usually failed.

The effect was most marked in a double-ended boiler with a combustion chamber common to two furnaces. Here the furnaces and chamber might be considered as a beam securely held at each furnace mouth. The effect of expansion in this case was distortion of the furnaces, together with a sagging effect and consequent failure of the back tube plates and saddle corners, due to the comparatively weak forms of these plates below the stay tubes. The inevitable bill for repairs could be materially cheapened by adopting a method of attachment for the furnace backs which would permit of a renewal of a furnace at a comparatively low cost. The back of the furnace was contracted in area, the corrugation tapering off in a bottle-neck shape and being flanged outwards to join the saddle piece, which was secured to the tube plate and combustion chamber.

Many serious troubles were due entirely to the great differences of temperature between the lower third of a boiler and the upper two-thirds. In the investigation carried out by Mr. C. E. Stromeyer it was found that this difference could amount to as much as 270 degrees F., which meant that in a double-headed boiler, 18 feet long, the variation in length would amount to nearly ½ inch. Worked out, this gave an equivalent of 13 tons per square inch as an extra stress to which the lower third of the boiler was subjected. The large percentage of cracked lower seams and leaky joints in this part of the boiler was undoubtedly due to this cause, and occurred more frequently in double-ended oilers.

Methods of Repair.

When cracks are discovered in a comparately new boiler, cutting out and renewing seemed in most cases to be the only alternative to patching, which was a most unsatisfactory method of covering a crack, especially in places where uniformity of section was essential for the proper transmission of heat. A new system was that of welding the cracks, or rather filling the cracks with new metal brought to a welding heat, by the oxy-hydrogen or oxy-acetylene method. Some difficulties were, however, experienced in using this system, and consequently electric arc welding had made a rapid advance in favor, and was the system now generally adopted.

In the Bernados system, an ordinary electric light carbon was connected to the positive main from the generator, the metal to be heated being joined to the negative main. In manipulating the tool, the carbon was touched against the metal near the part to be welded and drawn a short distance away, when the electric arc was struck and the metal quickly heated. The arc was about 4in. to 4½in. long. In about 12 seconds the required temperature was produced, the arc was removed, and the weld hammered in the ordinary way.

There was an objection, however, to the use of carbon, as it was found that a certain proportion combined with the welding metal, the result being that a material was produced similar to cast-iron, and therefore unsuitable for boiler work. Pommee, of Hamburg, recognizing the disadvantages of carbon, experimented with the system developed by Messrs. Albrecht and Dantz. The principal feature in this method was the iron welding pencil itself formed one pole, whilst the part of the boiler where the work was being done formed the other. An advantage was the avoidance of great heat in confined spaces, as the enormous temperature of the electric arc rapidly brought the small point on the surface being dealt with to a welding heat; the point of the iron pencil simultaneously rising to the same temperature, when a drop was deposited upon the work and combined with the metal heated to receive it. The drops followed one another in quick succession until the fracture was filled and the work completed. The objection to heating the plates over a large area was thus avoided, for although the temperature was high (about 3,500 degrees C.), it was rapidly produced and the work was finished before the heat was transmitted to any extent to the surrounding metal.

The method of dealing with local wasting of the plates was simply building up to original thickness the plate where wasted. It was necessary to remove the oxide or dirt by first chipping to bare metal and then drop by drop to add to the thickness until something over the original scantling was reached.

VIBRATION FROM HEAVY OIL ENGINES.

THE arrangement of engine seating and general structure of the vessel's bottom in way of the engine is a question that barge and coaster builders who are taking up the oil engine would do well to consider. There is no denying the fact that the 100 h.p. or 200 h.p. residue oil engine running at about 300 r.p.m. gives off a good deal of vibration. This, of course, does not constitute a

point on which to condemn the heavy oil engine. Vibration is certainly not desirable, but it is to a great extent inseparable from all slow running internal combustion engines, and when we know this fact, the remedy lies in fitting stiffening sufficient to resist any strains likely to be set up on a vessel's bottom plating, etc., through continuous running.

The practice in some quarters is to fit channel bearers on the top of shallow floors in the motor coaster or lighter of 100 h.p., but such a course is not, in our opinion, advisable, and in many cases which have come under our notice we have felt increased vibration at full load. Recently we had a look over the six Beardmore-engined coasters building at Kirkintilloch, Rutherglen, and Leith for the Coasting Motor Shipping Co., Glasgow, and were interested to find that this was a matter which had been given special attention to by both engineers and shipbuilders. In every case, the channels are dispensed with, and the seating built right up to the height of the engine sole. In vessels of this class, which are built of steel, there should always be stout intercostal plates fitted under the engines, with heavy upper angles to take the holding-down bolts. These intercostals should be carried the entire length of the engine-room, and have angle connections to the bulkheads.

It is also advisable to run a 12 or 15in. rider plate of about ¾in. thickness along the top of the floors in way of the fore and aft girders or intercostals, to take the bolting down of the engine, and to have these plates also connected to the engine-room bulkheads. There should always be double reverse frames in way of the engine carried well up to the bilge, and where the engine casing is a long one, involving the cutting of a number of beams, an 8in. web frame in the vicinity of the fly-wheel, carried to the height of the main deck stringer, is a good course to follow. In classed vessels, of course, the society, under whose rules the ship is built, looks after this, but there are many vessels, up to 150 or 300 tons d.w. carrying capacity, built that are not classed; in fact, on the West Coast of Scotland at the present time there are no fewer than seven 140 ton d.w. motor coasters that are not to any society's rules.—Journal of Commerce.

SANK WITH AEROPLANE MOTION.

SIR RAY LANKESTER, the eminent scientist, estimates that the Titanic sank through two miles of water to the bottom of the ocean in from half an hour to an hour, according to the amount of air that was bottled up in the giant ship's cabins and compartments. The Titanic, after she disappeared below the surface, says Sir Ray, followed the motion of an aeroplane, that is, she dived and glided this way and that, swiftly sailing lower and lower until at last one mighty glide landed the gigantic vessel upon the bottom where she will rest forever in the almost absolutely constant temperature of about forty degrees.

If the final dive of the Titanic was at a sharp forward angle she ploughed her prow deep into the everlasting mud and ooze. If her last dive was with her stern down, the ship may be standing partly on end. But if the final aeroplane curve of the sunken Titian of the seas was on an easy arc she probably slid along for a quarter of a mile on the bottom before she stopped to rest for once and all, bolt upright, on an even keel as if in her own dock at Belfast.



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IN THE GRECIAN ARCHIPELAGO.

Fair Australian Passenger, who has never seen snow before: "Oh! Captain, what is that white on the mountains?"
Captain: "Why, that's snow."
Fair Passenger: "There! I knew it was—and the chief engineer told me it was Greece!"

PROGRESS IN NEW EQUIPMENT

There is Here Provided in Compact Form a Monthly Compendium of Marine Engineering Product Achievement.

NEW METHOD OF MEASURING STEAM CONSUMPTION.

THE steam consumption of a turbo generator has been reduced to as low as 12 lbs. per kw. hour. This high economy is secured by careful operation and by refinements in the efficiency of auxiliary apparatus. If, however, the operating force has no guide in maintaining high efficiency, a fall in pressure, superheat or vacuum, a badly adjusted load or wear of turbine blades, may cause loss of economy, which is far more serious than generally realized. For instance, in a recent case, a turbine had been operating for some unknown reason at 125 per cent. of its normal steam consumption. This condition was not discovered for some time, in fact, until the boiler load had become so excessive that it could no longer pass unnoticed. In the meantime, the excessive steam consumption of the turbine had caused a loss of about five tons of coal per 1,000 kw. per day.

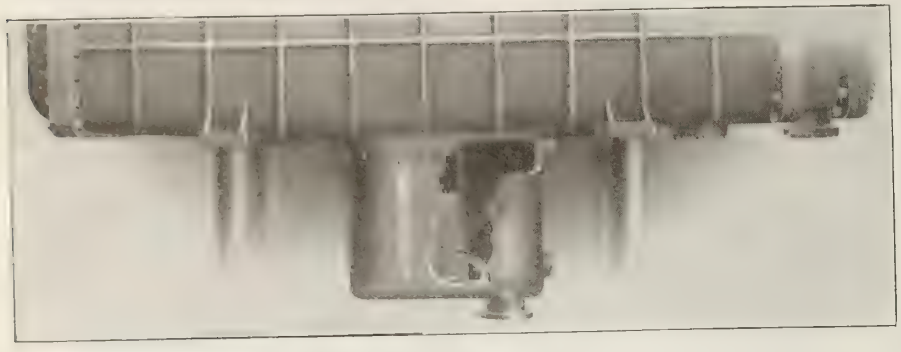


Fig. 1—Surface Condenser, showing indicating hot well attached directly to condenser shell, replacing the ordinary hot well.

The Indicating Hot Well.

The steam consumed by a turbine or engine can be determined with absolute accuracy by weighing the "steam water" or condensate from a surface condenser. Very few owners have employed this method of measurement due to the fact that ordinary weighing or measuring devices are costly and clumsy, adding not only to the expense but complicating piping, and withal, perhaps none too accurate. A simple, accurate and direct solution of the problem is presented in the indicating hot-well, fig. 1, which is similar in size and appearance to the ordinary hot-well and is attached directly to the bottom of the condenser, forming a part of the shell. The opening in the bottom of the condenser is built so that the condensate drains into the left-hand chamber of the hot-well, and communication from this chamber to the hot-well pump suction is secured through an orifice in the dividing wall. The velocity of discharge through an orifice of given diameter, varies directly as the square root of the head, and the quantity of water discharged is equal to the product of this velocity, the area of the orifice and the co-efficient of contraction. With a properly designed orifice this co-efficient remains almost exactly constant for widely different values of the head upon the orifice, therefore, the quantity of discharge is obtained with a high degree of accuracy by a carefully calibrated indicating gauge glass, reading the head.

Indicating Gauge Glass.

As may be seen from the illustration, the orifice is formed in a brass plate inserted in the partition wall. It is polished and finished to insure accuracy of flow. Especially manufactured fittings are used to attach the indicating gauge to the shell of the hot-well. Ball check valves are provided in each fitting so that should the gauge glass break, the inflow of air will be prevented and the gauge glass can be replaced at leisure. A gauge glass is also provided to show the height of the water in the hot-well suction compartment, where the water must not be allowed to submerge the orifice. The scale attached to the indicating gauge reads directly in pounds of steam per hour. Each orifice is made independently, carefully calibrated, and a special scale, etched upon steel, furnished for it. Over the whole range of readings, the accuracy is within 2 per cent., and for readings from 75 per cent. to 125 per cent. load, the accuracy is within 1 per cent.

The indicating hot-well is a practical and simple solution of the problem of measuring steam consumption. The indicating gauge reads pounds of steam per hour; the station watt meter gives load in kw., and the rate of steam consumption in pounds per kw., hour is obtained by simple division. This fig ure entered properly upon the engineer's log sheet, and charted from day

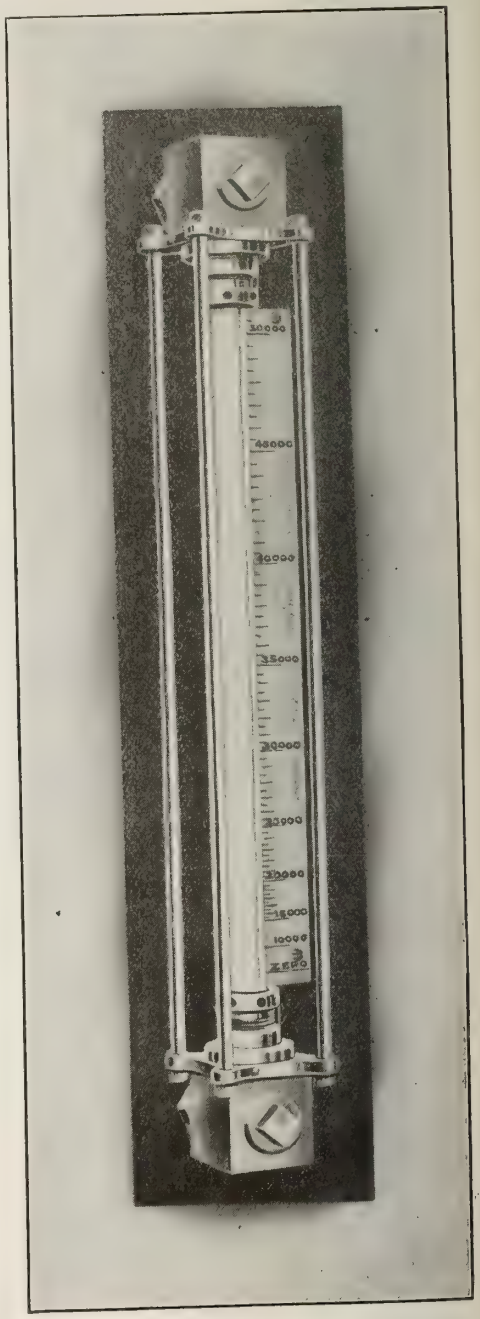


Fig. 2—Gauge glass and scale of Wheeler indicating hot well.

to day, is of the greatest importance in maintaining high economy.

The manufacturers of this equipment are the Wheeler Condenser and Engineering Co., Cartaret, N.J.

NEW YORK HARBOR IMPROVEMENTS.

A CONSULAR report on the proposed harbour at Jamaica Bay, Long Island, states that the Sinking Funds Commission have approved the appropriation of $1,000,000 for the improvement of Jamaica Bay, the money to be spent for the preliminary work of dredging the inner channels of the supplementary harbour. The whole project contemplates the creation of a great harbor for freighters, which will be from two to four hours nearer the open sea than any dock which New York or Brooklyn now possess. There will be 150 miles of new wharfage. The harbor will also serve as a terminal for the State Barge Canal, and an associated plan provides for the construction of a canal from Flushing Bay to Cornell's Basin in Jamaica Bay, a distance of 8 miles. Thus barges from Buffalo and inland cities on the Barge Canal could pass from the Hudson through the Harlem River, through Hell Gate and into the new canal to Jamaica Bay without encountering the open sea. It has also been proposed, by way of relieving the North and East River docks, to construct a sheltered waterway between Gravesend and Sheepshead Bays, which would have an entrance to Jamaica Bay through the channel to the west of Barren Island.

EXPERT EVIDENCE AT THE TITANIC ENQUIRY.

EVIDENCE of a nature interesting to naval architects and shipbuilders was given before Lord Mersey, in course of the Titanic enquiry by Mr. Leonard Peskett, naval architect of the Cunard Company. This gentleman had assisted in designing the Mauretania and Lusitania. He said that the Mauretania had 14 watertight bulkheads, with longitudinal watertight divisions running down each side of the ship to the after part of the engine-room. In addition to these longitudinal and transverse bulkheads, there were watertight decks at various levels in the ship. The double bottom was carried eight feet up the side of the ship. In his opinion a combination of transverse and longitudinal bulkheads was the best for all purposes for very large ships. He had heard Mr. Wilding's objection that if the ship were wounded on one side it would cause a list, but this could be counteracted by flooding compartments on the opposite side.

In the Mauretania, no difficulty on account of coal dust had been experienced in closing the watertight doors. These doors were closed every day at twelve o'clock as a matter of precaution. There were, altogether, 69 watertight doors on the Mauretania, 10 being above the water mark, and arranged to close by hand. Of the remainder, 36 could be closed either by hand or by hydraulic power. Asked whether his firm had considered the advisability of having a continuous watertight deck, Mr. Peskett said they were doing so on the Aquitania, now under construction. Replying to his Lordship, the witness said the engineers would be in a kind of watertight box, but it would be perfectly easy for them to reach the deck through watertight hatchways. He added that on the Mauretania no difficulty had been experienced on account of the working of the cargo through the watertight hatchways. The new German ships were being built on the lines of the Lusitania and Mauretania, but at present they were the only vessels afloat, other than warships, with a continuous system of bulkheads.

THE STEAMSHIP CENTENARY.

PROGRESS is being made with the organization of the exhibition which is to be held in the Glasgow Art Galleries from early in July until the end of the year in connection with the celebration of the centenary of steam navigation in Great Britain. A large number of exhibits of shipbuilding and engineering interest are being lent, including many models of vessels typical of different stages in the progress of naval architecture and marine engineering since the launch on July 24, 1812, at Port-Glasgow, of Henry Bell's Comet. There will be several models and drawings of the Comet and her machinery. The majority of the exhibits relating to the early days of steam navigation will be associated in one way or another with this vessel and with the Charlotte Dundas, which preceded her by a few years, but was allowed to fall into decay at Falkirk. The part played by William Symington, Patrick Miller, James Taylor and Henry Bell, who were the pioneers of steam for marine propulsion, will also be given large prominence. Other exhibits will show the progress made in later years, down to the oil-engined ship Jutlandia, while the collection will be so arranged as to illustrate the story of the century in steam navigation.

U.S VESSEL CONTRACTS.

THE Pittsburg Steamship Co. has contracted with the American Ship Building Co., for a 600-ft. steamer to be constructed on the Isherwood system. The new steamer will be 600 feet over all, 580 feet keel, 58 feet beam and 32 feet deep, and will go into service in the spring of 1913. The American Ship Building Co. takes over three small vessels as part payment.

The Great Lakes Engineering Works, Detroit, has booked an order for the construction of a big fleet of steel barges, for an eastern firm of coal shippers. The barges are to be 240 feet long by 36 feet wide and the machinery will consist of a gas plant, gas engines and propellers. The contract price is said to be in the neighborhood of $70,000 each.

HEATHCOTE-MALMSTAD COLLISION.

L. A. DEMERS, Wreck Commissioner, together with Captain R. MacDonald, and N. H. Townsend constituted a Court of Inquiry into the collision between the S. S. Heathcote, owned by the Dominion Coal Co., and the S.S. Malmstad chartered by the latter company, in Louisburg Harbor, N.S., on March 20.

Summary of Finding.

The court finds that the Malmstad occupied what is considered the proper anchorage, and that its position did not obstruct the range lights which serve as a guide for the passage between White Rock and Battery shoal. A proper watch was kept and the regulation lights were burning. When a collision seemed imminent, chain was promptly payed out; this being the only practical alternative for the anchored vessel.

Regarding the Heathcote, it is evident that on account of an extremely limited draught forward, she was carried rapidly to leeward by the prevailing winds, and insufficient allowance was made therefor. The court holds that the master of the Heathcote acted imprudently, and showed lack of judgment in navigating the vessel as he did under the conditions existing. Further, examination of the Heathcotes' log discloses its incompleteness in recording the details of the circumstances preceding and attending the collision.

In view of the facts, the court exonerates the master and officers of the Malmstad from responsibility for the collision, and finds that Capt. Alex. Muir of the s.s. Heathcote committed a grave error of judgment in attempting to cross the bow of the Malmstad in the manner he did, for which he is severely censured and cautioned to exercise more prudence and discretion in future.

MARINE ENGINEERING of Canada

A monthly journal dealing with the progress and development of Merchant and Naval Marine Engineering, Shipbuilding, the building of Harbors and Docks, and containing a record of the latest and best practice throughout the Sea-going World.

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Vol. II JULY, 1912 No. 7

TORONTO HARBOR.

MORE or less energy is being expended in an attempt to arouse interest and enthusiasm concerning the near future possibility of the City of Toronto becoming a great shipping port. Progress in this latter direction has in the past been limited to "hot air" effusions and prospects of it continuing so in coming days are of the rosiest description. It had better be at once realized that the Queen City can never claim to be more than a popular watering place, thanks to its beautiful bay and location on the shore of Lake Ontario. As a port, it is on the direct line to or from nowhere in particular, so far as freight by water is concerned. Its water front, is not capable of taking care of its own supplies, being completely monopolized at the points of most utility by our enterprising railroads.

Toronto's greatness will never be attributable to its standing as a centreof much shipping, and to save itself the epithet, "a hole in the bush," the powers that be should turn their attention to its development as Ontario's fashionable watering place. The location and waterfront of the city compares more than favorably with the natural features of famous British and American lake and ocean resorts, but so far as effort to take advantage of these and turn them to account for the public weal is concerned, there has been absolutely nothing done. The public spirit of Toronto, reflected in its rulers, is not quite that of "being asleep" as our friends of the Eastern Metropolis are prone to dub it, rather is it in very essence a muddled up, mis-directed, yet energetically pursued series of enterprises embarked upon regardless of cost, results or returns. If a less jealous eye were directed towards Montreal, without whose enterprise the relative development of Toronto would have amounted to but little, and if more attention were turned inwards on itself, there would be apparent less of the mad craze to outrun the former by butting-in without qualification. A large reduction of pretence and a more realistic display of actual accomplishment are features which apply with peculiar force not only to Toronto's harbor, but to the many other departments responsible for the citizen's welfare.

SIZE OF OCEAN VESSELS.

THE International Congress of Navigation recently held in Philadelphia, wisely decided to dissociate itself from any proposition which has for its aim the limitation of size of ocean vessels. Since the Titanic disaster, people, more or less irresponsible, have attributed the passing of this masterpiece of Naval Architecture and Marine Engineering to its abnormal size, when, as a matter of fact, the degree of passenger and crew rescue work achieved goes to show that the gigantic proportions of the vessel were almost wholly contributory to the desirable result. Legislation or society regulation would certainly be overstepping their sphere of usefulness did they seek to tamper with or stay commercial progress.

It is significant, that expert opinion of every Nationality is unanimously in favor of the big ship, and while its development towards the highest degree of perfection so far as safety of those aboard is concerned may be more or less delayed, the future, with the lessons of the past as a guide, will justify abundantly the wisdom of the procedure.

THE BIG DITCH AS A BIG STICK.

WHATEVER else be its value and destiny, it is quite apparent that a certain section of the American public look upon the Panama Canal as the "big stick" wherewith to round up the maritime nations of the world to its way of thinking. The latest, and perhaps most ridiculous display of browbeating was the proposal—referred to in another part of this issue, to bring European nations into subjection on the question of armament reduction; the service of the canal being denied them, unless they each agreed to build not more than one battleship per year. We are glad to say that the motion was defeated, nevertheless, its birth, being highly expressive of an all too prevalent type of "Canal" sentiment, arouses curiosity as to what "club" proposition will next be suggested.

The outlook of many individuals, both in private and public life, is so obscured by their own importance, that they would have this great achievement of the American nation turned into a stink hole of idleness, rather than allow commercial enterprise pursue its onward and civilizing course. The untrammeled service of the Panama Canal should be, and we are pleased to say, is, by all thoughtful citizens of the United States, but a recognition of their indebtedness to European nations for the part they have played in developing and placing in the spot-light, that country's wealth, inventive genius and manufacturing prowess. A gracious and non-churlish attitude in the disposition of the Canal service is the beneficiary's privilege, and in its wholehearted discharge there follows as "the night the day," the beneficiary's reward.

Notable Personalities of Canada's Merchant Marine

The Part That Shipbuilding, Marine Engineering and Shipping Companies Have Played in Bringing Canada Prominently Before the Eyes of the Civilized World, Has Not, We Believe, Received That Credit of Performance Which is Its Due. We Hope in This Series Dealing With "Notable Personalities of Canada's Merchant Marine," to Show That Those Who Have Bridged The Trackless Ocean to our Shores, and Provided the Facilities for Our Disembarkation, Are Worthy of at Least a Sentimental Regard.

ROBERT REFORD.

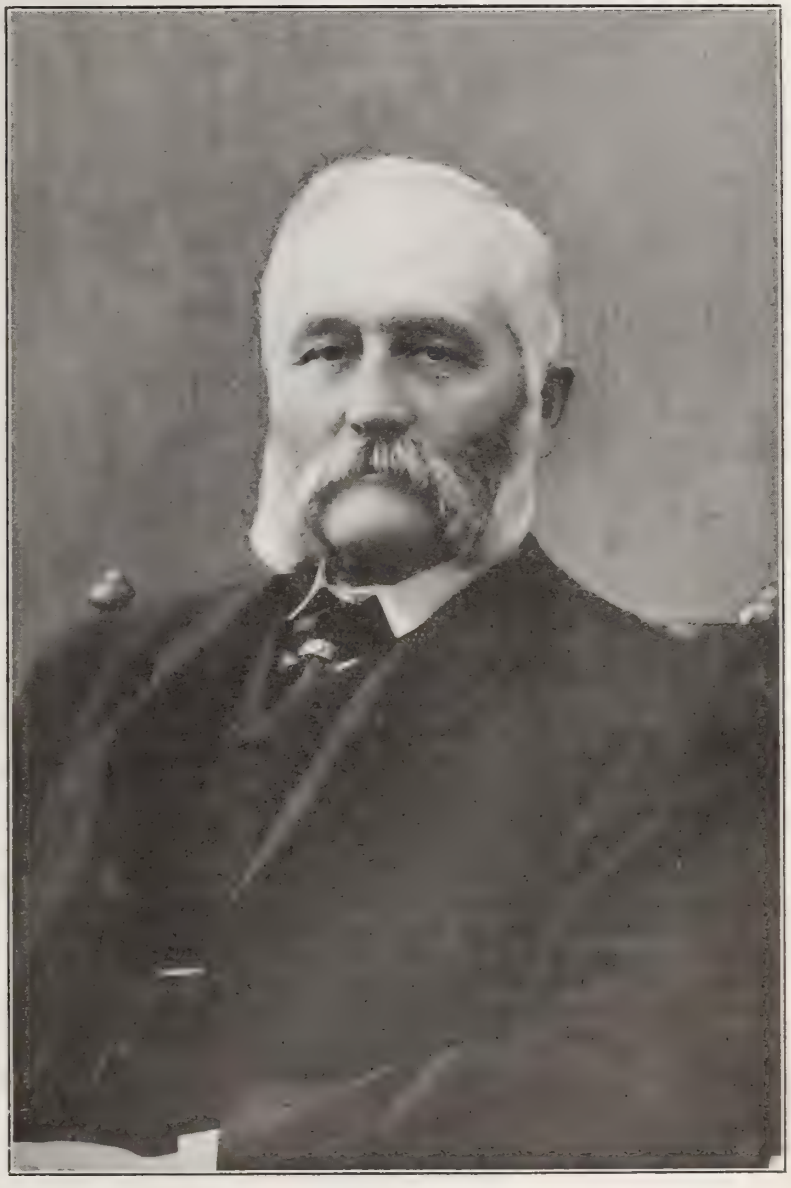
ROBERT REFORD, of The Robert Reford Co., Ltd., Montreal, came to Canada from Belfast, County Antrim, Ireland, in 1845, settling and doing business in Toronto as a wholesale grocer, importer and shipping agent for shipping on the Great Lakes, under the firm name of Reford & Dillon, until 1865. In 1865, by wish of shipping friends in Scotland, the firm opened a branch in Montreal for the extension of its business and the work of ocean shipping. This was the beginning of the present Montreal firm. About 1870 the Toronto business was disposed of to Smith & Keighley, and some years later Mr. Dillon retired. Still later, the present company of Robert Reford, Ltd., was formed, consisting of: Robert Reford, President; William I. Gear, Vice-President; R. W. Reford and A. D. Reford, Directors.

The new firm since its formation has done but little in importing or general business, confining itself almost entirely to ocean shipping as agents for or part owners of the following steamship lines:—The Donaldson Line, with weekly, and sometimes more frequent sailings between Montreal and Glasgow in summer, and St. John and Glasgow in winter, with subsidiary lines to Baltimore, Newport News, and other U.S. ports; the Thomson Line runnisg a weekly service during the summer between Montreal and London, and during the winter between Portland and London and other ports; also giving steamship services to Newcastle, Leith, Aberdeen and ports on the east coast of Great Britain, with a regular service from French, Spanish, Portuguese, Italian and Greek ports in spring and fall of each year, thereby creating a large trade with Canada in the products of these countries, and the only firm doing this business.

The Reford Co. also acts as agents for the Cunard Canadian Line of Steamships between Montreal, London and Southampton, and for the Crown and Direct Steamship Lines of steamers between Montreal and the West Indies; the Pickford & Black Line of steamers between the Maritime Provinces and the West Indies; and for other steamers engaged in trade to ports in South America, and elsewhere.

In addition to the above, Mr. Reford is also interested in the following Canadian enterprises:—President of the Mount Royal Milling and Manufacturing Co.; director of the Bank of Toronto; director of the Lake of the Woods Milling Co.; vice-president of the Labrador Co.; president of the York Lumber Co.; a governor of McGill University, and a member of the Mount Royal and Canadian clubs of Montreal.

He also acted as chairman of the Royal Commission on Transportation during the years 1904-5, the business of which was to report on improvements possible for the increase of the shipping and transportation trade of the Dominion, ocean and inland. The work neces-



ROBERT REFORD.

sitated the visiting by members of the commission of every Canadian port and waterway between the Atlantic on the east and the Pacific on the west, supplemented by reports from personal observation and evidence obtained from residents on the spot, able to judge of the wants of the country. This report being presented to the Canadian Government in December, 1905, embodying recommendations for the building of the Georgian Bay Ship Canal between Montreal and Lake Huron; the formation of National Ports on the Atlantic and Pacific oceans and on the St. Lawrence and Great Lakes; and for fast up-to-date steamship services on the Atlantic and Pacific as the beginning of an All-round-the-World British Steamship service, superior to any given or possibly to be given by the United States or any other country, which would bind together by closer ties all portions of the British Empire, because of the shorter ocean passage between Canada and Europe via Great Britain on the East and Asia and the Orient on the West, with recommendations as to the Port of Halifax in Nova Scotia being the Canadian terminus and Galway, Ireland, the British terminus for the Atlantic Fast Service. The above recommendations have attracted a great deal of notice on both sides of the Atlantic and in the British Parliament, and will, without doubt, in the near future become a reality. The sooner, the better, as the building up of Canada into a greater Britain is a necessity for the growth and welfare of the British Empire and the continuance of British supremacy on land and sea.



THE NEW DONALDSON LINER "LETITIA."



PORT BOAT DECK—NEW DONALDSON LINER "LETITIA."

THE DONALDSON LINER "LETITIA."

THE new Donaldson liner Letitia, built by Scott's Shipbuilding and Engineering Co., Ltd., Greenock, Scotland, made her trial trip on April 23. The dimensions of the vessel are:—Length between perpendiculars, 470 feet; breadth, moulded, 56 feet 8 inches; depth molded, 39 feet 6 in. to the shelter deck. She has been designed for the emigrant trade and takes the highest class at Lloyd's. The second-class accomodation is on the bridge, shelter and upper decks, staterooms being provided for over 300 passengers of this class. On the shelter, upper and main decks there is accommodation for about 600 third-class passengers, principally in two and four-berth staterooms.

The vessel will carry a large cargo, there being five holds, served by ten derricks and ten steam winches. Refrigerating chambers are provided for ship's provisions and cargo, the plant being on the CO_2 system. The Marconi system of wireless telegraphy has been installed. The machinery consists of two sets of triple-expansion engines, with cylinders 26 inches, 43½ inches and 72½ inches by 48 inches stroke, taking steam from six single-ended boilers working under natural draught. The steam steering gear is by Messrs. John Hastie & Co., Ltd., Greenock, whose Canadian representatives are William C. Wilson & Co., Toronto. The telemotor was supplied by Messrs. McTaggart, Scott & Co.

WAREHOUSES AT G.T.P. TERMINALS.

THE organization of a company to establish a chain of terminal warehouses from Montreal to the Pacific coast, in connection with the Grand Trunk and G.T.P. Railway systems was announced recently.

It will be known as the Grand Trunk Terminal Warehouse Co., and follows logically on the problems of railroad traffic congestion arising from the unparalleled activity in all lines of business throughout Canada. Contracts have been entered into between the new company and Grand Trunk Pacific, by which the former undertakes to establish and operate a chain of warehouses across Canada; the railroad companies on the other hand, agreeing to turn over to the new company all their warehouse business at the various points for a period of 30 years.

The first chain of warehouses will include Montreal, Toronto, Fort William, Winnipeg, Calgary, Edmonton, Vancouver and Prince Rupert, and once this chain is established, steps will be taken to enlarge it by additional plants at points where business demands.

J. N. Greenshields, K.C., is the moving spirit in the new concern. The close connection between the new company and the two railway systems is indicated by the fact that the G.T.R. has allowed the use of its name. Three prominent railroad officers will be among the directors.

The capital of the company will be $10,000,000 bonds, of which $5,000,000 will be issued at the present time, and $6,500,000 common stock. The first offerings of the bonds was made privately by the Quebec Savings & Trust Co., and it was stated that upwards of $1,000,000 of the issue had been taken during the first day.

Vancouver.—The Dominion Government suction dredge Fruhling, Captain Gosse, is at the Wallace shipyards, North Vancouver, to undergo a general overhaul. The Fruhling is engaged in sandbar work on the Fraser river and has been working steadily since her arrival from Germany. The Mastodon is now ready for service, and will proceed to Coal Harbor shortly to dredge out the channel.

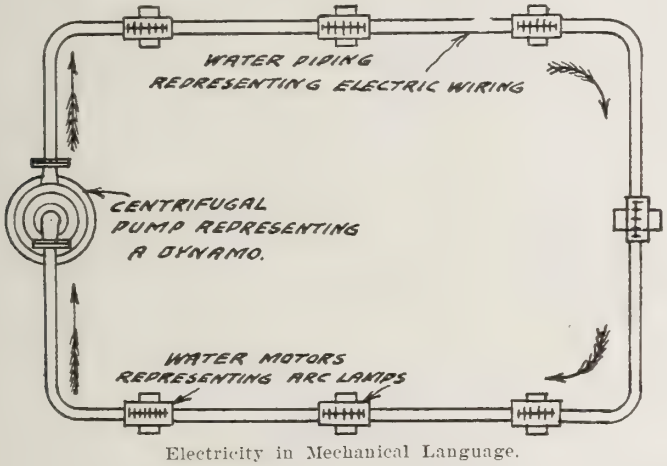
READERS' NOTES AND VIEWPOINT

Devoted to Brief Article Contributions Covering Experiences, Correspondence and Comment on Matters Marine. We Pay for Suitable Material.

ELECTRICITY IN MECHANICAL LANGUAGE.

TO facilitate the acquirement of a general electrical knowledge by operating engineers, a method involving the adoption of analogies between steam or water and the electric current has found much favor. A study of electricity along these lines enables a clearer and quicker grasp to be got of the principles involved, without in any way endangering the quality or result aimed at.

The mechanical and operating engineer is accustomed to deal with elements which flow and circulate through pipes and similar devices, and if he finds that in the study of the electric current he can use these as aids, it does not necessarily follow that they be incorporated in his electrical equipment as realities.



Electricity in Mechanical Language.

The accompanying sketch shows by analogy with a water pumping equipment, a continuous current series system of arc lighting. A centrifugal pump piped from its discharge outlet to an installation of water motors with return to its suction, forms the basis on which it is hoped to display an easy and intelligent means of acquiring the electrical idea.

The starting-up of the pump, with its chamber, and the piping full of water, causes a continuous circulation throughout the system on an energy expenditure of amount corresponding to the friction of, or resistance to the flow of water. This friction of water in pipes as is well known has to be provided for in pump installations generally. Thus far, we have carried the analogy to the point where the pump may be called the dynamo, the piping the cable or wire, and the friction or resistance to water flow, that of the resistance offered by an electrical conductor.

The introduction of a number of water motors on the line of flow, to be impelled by it, means additional energy expenditure on the part of the pump whose capability in circulating the water will determine their efficiency. Introducing the analogy again, our water motors correspond to the arc lamps in an arc lighting installation; an almost similar effect being there readily noted.

From the continuous circulation of the water through a single pipe line on which is placed the various water motors, we have as the result a continuous current dynamo operating on a single circuit with a series distribution of lamps, and known as already stated as the continuous current series system of arc lighting, which finds application in docks, warehouses and kindred outfits.

THE STEAM TURBINE.

THE predominant feature and all-absorbing topic in the world of motive power engineering to-day is the steam turbine and its wonderful outlook, if one might judge from the more or less interesting statements that find their way into the pages of technical and trade journals.

The trouble department is conspicuous by its absence in most of the "write-up" matter pertaining to this latest engineering development, leading one to infer that although in the earlier years its progress towards becoming a powerful public utility was marked by numerous mishaps, their complete elimination is now a "fait accompli." All achievement worthy the name is accomplished through much labor and great expense, yet withal in no sense ever perfect. The steam turbine, with us to-day, is a tribute to man's inventive and progressively perfecting genius, and it may be truly said, is portentous of immense utilitarian possibilities, whose attainment can only come through trouble and breakdown experiences.

It has to be realized then that the steam turbine has troubles existent and ahead for designers, constructors, owners and operators. Little is heard of them, however, for obvious reasons. We don't expect those interested to advertise them, and a leakage in the cordon of those-in-the-know is what we have to depend upon for information from behind the scenes. It is safe to say that most steam turbine manufacturers have had and are having experiences the reverse of gratifying in many instances.

Vane or Blade Troubles.

Blade troubles are as we would naturally expect predominant; their myriad use, fine clearance and temperature variation being more or less contributory causes. Blade clearance has been and is a prolific source of trouble. Theoretically the best economy should be obtainable by an almost entire absence of clearance between rotor blade tips and the casings, and between the casing blade tips and the rotor. Outside of this blade trouble, the steam turbine compares more than favorably with the reciprocating engine in the matter of liability to breakdown. Against this, however, we must not lose sight of the fact that the latter is practically speaking an open book, visible to and giving audible warning of approaching trouble, and accessible, therefore, in the matter of ways and means of minimizing or altogether preventing serious consequences. The steam turbine, again, is a more or less closed volume, and, therefore, has to be taken largely on trust as to internal condition of operating parts.

The disposition to let well alone in the absence of trouble is human and often a species of laziness. It flourishes in invisible situations and mechanisms peculiar to diversity of circumstance requirements. That it should be so is altogether wrong in principle for concealment must always warrant oftener and more painstaking inspection than does constant tangible, visible and audible approach. Ample provision should be made and opportunity afforded for opening-up the turbine with minimum disturbance of accessory connections, obviating, thereby, any cause for neglect and want of knowledge of its vital features.

Reduction of clearances does not in its

economical aspect, warrant the involving of the attendant risks, and so long as casing distortion is a factor to be reckoned with, the disappearance of what were only delusionary clearances at the start, may be anticipated from the variations of temperature between comparatively wide limits. Short castings show less distortion than do long ones, and those of a purely local nature may be attributable to too rapid or incomplete warming up on starting. In the reciprocating engine this latter practice runs to trouble, and the steam turbine also shows its dislike by distortion and blade stripping.

The steam turbine is more addicted to cause priming than the reciprocating engine, its capacity for drawing steam being greater. Several cases of blade stripping have been credited to a heavy inrush of water along with the steam on a too sudden opening up. The theory advanced, highly tenable and practicable, is that the blades were first bent, or their binding disturbed or broken. Faulty brazing of the blade lacing may always be more or less contributory to blade stripping, and segmental blading which is now common, lends itself perhaps to poor workmanship in greater degree than does the individual method.

Rotor Troubles.

Rotor troubles in the early days of turbine construction were largely in evidence. They have, however, been almost entirely eliminated by a change in material and method of building. The boiler plate drum, internally butt strapped, stiffened by screwed stays and cast steel segments, has given place to the weldless steel drum stiffened internally by ribs turned out of the solid. The cast steel spider for attaching the drum to the rotor shaft has been sidetracked in favor of forged steel with sawn or slotted out arms, thereby removing the tendency to arm cracking, common to the steel casting.

Lubrication Troubles.

Forced lubrication is usually adopted, the oil being pumped to the bearings under pressure. In some cases, however, the oil is pumped to sight feed lubricators, from which the various bearing supplies can be seen and regulated. Turbine bearings may run safely at higher temperatures than those of reciprocating engines, and record is had by fitting thermometers to the various bearing oil wells. A pressure of 1 pound per square inch is usually carried with forced lubrication, it being found sufficient and conducive to less leakage loss. The lubrication of the bearings, etc., of the steam turbines must never cease while the machine is under operation else trouble of every kind more or less disastrous will be forthcoming.

Conclusions.

From what has been said, steam turbine troubles may be and are largely avoidable. The features of blade clearance and binding, rotor drum and spider attachment to rotor shaft, materials of construction, efficient lubrication, first class workmanship and careful intelligent operation are one and all capable of and are being realized. This admitted, the steam turbine is without doubt in advance of the reciprocating engine, as far at least as freedom from operating trouble is concerned.



Questions and Answers

By Calliope

16—Q. What is piston speed and how is it expressed?

A. Piston speed is the distance in feet the piston actually travels in one minute. It is usually expressed as piston speed in feet per minute.

* * *

17—Q. In a steam boiler shell, the solid plate is reckoned as being 100 per cent. What are the comparative percentages that can be got by using single double and treble riveted lap joints, double and treble riveted double butt strap joints?

A. Single riveted lap, 56 per cent., double riveted lap, 70 per cent.; treble riveted lap, 75 per cent.; double riveted double butt strap, 80 per cent.; treble riveted double butt strap, 85 per cent.

* * *

18—Q. In a double butt strap joint, the outer butt strap is usually made narrower than the inner. Give the reason why?

A. It ensures a good caulking edge on the outer strap, free from liability to "spring" between the rivets, which are of close pitch.

* * *

19—Q. From what part of the joint do we reckon the strength of plate left between rivet holes, in a treble riveted double butt strap joint?

A. From between rivet holes on the outer and widest pitch longitudinally.

* * *

20—Q. What is meant by single and double shear, as applied to rivets?

A. Single shear means that the rivet has only got to cut or shear through once before the joint gives out. Double shear means that the rivet has got to cut or shear through twice before the joint gives out.

* * *

21—Q. Give an example of single shear rivets and double shear rivets.

A. The rivets in a lap joint are in a single shear. Those in a double butt strap joint are in double shear, in all cases of their passing through both butt straps. Where the outer butt strap is narrower than the inner, the outer row of rivets is in single shear, because they pass through the shell and inner strap only.

* * *

22—Q. In a slide valve engine how is the steam usually admitted to the cylinder?

A. Over the ends of the valves.

* * *

23—Q. In a piston valve engine how is the steam generally admitted to the cylinder?

A. Over the ends of the valve, or in the centre of the valve.

* * *

24—Q. With the slide valve, where does the exhaust get out?

A. At the centre of the valve.

* * *

25—Q. With the piston valve, where does the exhaust get out?

A. At the centre or over the ends of the valve, depending on how admission is made.

* * *

26—Q. What is the relation of the eccentric to that of the crank on a slide valve engine?

A. 90 degrees plus the lap and lead in advance of the crank.

* * *

27—Q. What is the relation of the eccentric to that of the crank on a piston valve engine?

A. If steam is admitted over the ends of the valve it is 90 degrees plus the lap and lead in advance of the crank. If steam is admitted at the centre of the valve, it is 90 degrees less the lap and lead, behind the crank.



STRANDING OF THE EARL GREY.

THE following is a summary of the judgment delivered by L. A. Demers, wreck commissioner, concerning the stranding of the Dominion Government steamer Earl Grey at River John in the Northumberland Straits on April 17.

The court finds that Capt. Angus Brown was unable accurately to determine the speed of the ship, as the day of the stranding was the first occasion she had been navigated in clear water, following the loss of her propeller blades, and, that realizing the unreliability of his calculation with regard to the speed he should have adopted and the available methods of establishing his position, his action in proceeding at full speed in a dense fog, without sounding,

despite the fact that the vessel was equipped with a machine capable of determining the depth of the water while running at full speed, as well as his failure in insisting that a lookout be kept on the forecastle head, constitute, in the opinion of the court, grave errors of judgment.

Further, it is held that instead of relying almost entirely on assistance from other sources, he should have utilized the wire lying in the vessel's hold to lay a bower anchor. Even if the wire had not been of sufficient strength to dislodge the vessel, it would at least have acted as a deterrent against the vessel being driven ashore by strong gales. The reason given by the captain for the non-usage of the wire, to the effect that the chain attached to it, combined with its own weight would not be sustained by the boats, could not be accepted, for the mate in his evidence stated that he had procured spars from which to suspend the anchor between the boats to be utilized in hauling the vessel off. The captain's statement that he issued verbal orders for the speed to be reduced prior to the stranding remains uncorroborated, and the mode of procedure which he claims to have followed cannot be countenanced.

The court therefore suspends the captain's certificate for three months from Apr. 22. The court also holds that the pilot, McGregor Fraser, whose license extends from Pictou to Prim Point, was guilty of negligence through his failure to exercise necessary precautions with regard to the navigation of the vessel, and a copy of this finding will be forwarded to the Pictou Pilot Commissioners in order that they may deal with him. The second officer, F. P. Gallant, is considered to be insufficiently experienced in steamship navigation to occupy such a responsible position.

STEAMER PURCHASE.

THE Port Colborne and St. Lawrence Navigation Co., Ltd., has purchased the SS. "Algonquin" and "Cataract" as the nucleus for a new lake line of wheat and flour carriers. The former will take flour, for which her capacity is 2,700 tons, from the Maple Leaf milling plant at Port Colborne to Montreal. The "Cataract" will be used, for a time at least, in Montreal as a barge. We understand more boats will be built or purchased.

This enterprise is looked upon as the carrying out of Mr. Hedley Shaw's intimation at the time of the opening of the big mill at Port Colborne that the Maple Leaf Flour Milling Co. might do well to establish its own line of boats, owing to the discrimination in rates made by the railways against shipments of flour compared with wheat. The management of the navigation company is largely identical with that of the milling company; Hedley Shaw being present, John Carrick secretary, and Cawthra Mulock, W. D. Robertson, C. W. Band and E. H. Laschinger directors.

PANAMA CANAL LOCK GATES.

THE lower part of each leaf of the lock gates is a watertight air chamber, so that the leaf will be buoyed up by the surrounding water reducing the weight on its hinges and making it easier to move. In order to keep the leaf from lifting when the gates are closed, the upper part of the leaf has holes on the side toward the upper lock level to let water in and thus weight the leaf down. The air chamber of the west leaf of the upper guard gate in the east chamber of Gatun Locks was tested on June 10, by filling it with water. The leaf is built with a watertight manshaft extending from the top to the air chamber, and as this was also filled with water, the pressure in the air chamber was slightly greater than that to which the gate will be subjected when in use, as the surface of the water will be about one foot below the top of the gate. The test was highly satisfactory, the leakage being very small and easily remedied. The air chamber of this leaf contains 13,000 cubic feet. The upper guard gates, 54 feet 8 inches high, are the smallest of the gates in the locks, except the sea gates. For the higher gates the air chambers are proportionately larger.

THE WHALING INDUSTRY.

ONLY a few years ago the whale fishery, or whale catching as it ought rather to be called, was considered a dying industry. The Greenland whale had become scarce, and the profit of catching other kinds of whales was not large enough to cover the expenses. Recently, however, this avocation has suddenly commenced to be an item of considerable interest in the trade of Norway and other countries that have taken it up again because of the new and modern methods now available for utilizing all the products. Catching stations have recently been built in a large number of places all over the world. During the year 1911, 120 modern steamers operated north of the equator with a total catch of about 5,000 whales, from which were produced somewhere around 150,000 barrels of oil, or in all about 26,000 tons. In this number the Japanese fleet is not counted. Of far larger importance, however, was the catch during the same year in the southern oceans, where the total number of whales caught amounted to 22,500, yielding 650,000 barrels of oil, equal to about 103,000 tons, or nearly double that of 1910. For the year 1912, a further increase of about 10 to 15 per cent is expected. The Norwegian whaling industry employs in all nearly 10,000 hands, when the crews of the steamers and the working men at the factories ashore are included. Norwegian shipbuilding yards, who are known to be first-class builders of whaling boats, are very busy in supplying the demand for boats both for the home fleet and for foreign companies.

It is stated in the report of the Newfoundland Board of Trade that the result of the Newfoundland whaling industry for the year 1911, was about 20 per cent. short of that for 1910, and shows a still greater decrease when compared with the catch of each of the three previous years. The whales caught during 1911 number 337, as against 384 in 1910, and about 500 in 1909. The yield of oil was 8,237 barrels, as compared with 10,420 barrels in 1910. and only 445 tons of guano were obtained as against 618 tons in 1910. The total value of the 1911 products is estimated at $145,000.

AN ENCOURAGEMENT TO STOWAWAYS.

THAT the almost lost art of stowing away has received fresh impetus through the new regulations which make it necessary for all transatlantic steamships to equip their lifeboats with a goodly supply of edibles was indicated recently when the Savoie, of the French line arrived at New York with a trio of stowaways on board. The new regulations, arising out of the Titanic disaster is proving a boon to stowaways, who are arriving aboard nearly every steamship. The three stowaways were young men, and one of them, Charles Coussaint, 19 years old, a plumber by trade, said he was coming to America to learn to be an aviator. He laughed heartily about his predicament and said:"Although I am a young man, I have travelled all over the world, but never before have I known opportunities for sea voyages to be so good as they are now. If a fellow uses judgment he can crawl into a lifeboat, which contains plenty of good things to eat and water to drink to last the entire voyage. The boats are covered with canvas and one would not want a better and snugger place. When two days out we made a mistake by being too bold. We started to promenade the decks to get exercise and air, and it proved our undoing." The other young men were Emelio Garrique, seventeen years old, an optician's assistant, and Eugene Bolst, same age, a telegrapher.

PANAMA CANAL AND RAILROAD OWNED SHIPPING.

HAVING through many years reduced our once flourishing merchant marine to a mere spark, Congress now seems minded to step on to the spark. We had merchant ships on every sea when we could build them as cheaply as any other country and more so than most. Timber was then the material of which ships were made, and we had great quantities of it convenient to the shipyards. We have immense quantities of the raw material of which modern ships are made, and probably could beat the world again at shipbuilding; but Congress—to enable Mr. Carnegie to endow libraries and the Steel Trust to pay dividends on its common stock—has charged shipbuilding materials with high-tariff prices, so that it costs decidedly more to construct a modern vessel here than in Europe. When constructed, the ship must compete with cheaper European vessels on equal terms. Naturally American capital has declined to enter the race under that handicap and our merchant marine has nearly disappeared.

We still build ocean vessels for the domestic trade; but Congress proposes to handicap carriers by barring from the Panama Canal any ship in which a railroad has an interest, direct or indirect. Of course railroads should be encouraged to build ships. Transportation is their business. They have the capital, the organization and the experience for conducting it. Carriage by land and by water naturally complement each other. A great part of our present domestic merchant fleet is owned directly or indirectly by railroads. To say that we want the canal used by American ships, though no ship in which a railroad has any interest shall use it, is about on a par with giving an order for eggs with strict instructions that they must not be purchased at a grocery.

With full power over railroad rates, what has the Government to fear from railroad-owned ships in the canal? This restriction, if adopted, will be one more blow from Washington at American shipping. A glance at the statistics of ocean-carrying trade will convince most candid minds that there have been blows enough.—S.E.P.

DIESEL OR SEMI-DIESEL.

IN dealing with engines of under 200 h.p. there is no great difference in weight between the semi-Diesel model, in which the fuel is pulverized by compressed air, and the Diesel model proper, with its 500 lbs. working pressure, but when one comes to consider the semi-Diesel solid-injection engine alongside the Diesel, there is certainly much to be said for the former in the matter of weight-saving. A year ago the solid-injection engine was not so much in favor as it is to-day.

Theoretically speaking, it is not the same engineering job as the semi-Diesel of the air-compressor type, with its complicated valve gear, but theory and practice, as we know, do not always work out together, and the many vessels which have recently been turned out with solid-injection engines have proved that it is an engine which can be relied upon. Furthermore, the solid-injection engine is cheap, light, extremely simple and a unit that occupies little space . These are all features of the greatest importance in the commercial boat, which is out to make money for her owners. The pure Diesel is an engine which does not show to advantage in low powers; it is heavy, and calls for a longer engine room; but for powers over 200 h.p. or 250 h.p., where trained engineers are carried, the Diesel proper is to be recommended.

CANADA SHIPPING ACT AMENDMENTS.

THE Dominion Parliament has passed a bill providing for the repeal of sec. 100, chap. 113 of 1906, and sec. 7, chap. 65 of 1908, and for the insertion of a new section 100, as follows:—

"The foregoing provisions as to masters and mates shall not apply to pleasure yachts which do not carry passengers or goods for hire; to steamships of not more than five tons gross tonnage; to barges or other vessels having neither masts, sails or rigging, and not being steamships, or ships employed solely in fishing; to sailing ships of not more than 100 tons registered, and propelled by auxiliary power other than steam and employed partly in fishing and partly in the carriage of freight."

This exempts sailing ships fitted with auxiliary power from having to employ certificated masters or mates. Such vessels would be exempt under the previous law if employed solely in fishing. As they are engaged in carrying cargo, when not fishing, the law has been amended in this respect. Sec. 104 is also repeated and replaced by a new section, as follows:—

"Whenever any master, mate or second mate proves to the satisfaction of the minister that he has, without fault on his part, lost or been deprived of any certificate required under this part, the minister may, upon such terms and conditions as he deems fit, cause a copy or duplicate or the original certificate to be made out and certified as aforesaid, and to be delivered to such master, mate or second mate."

Under previous conditions, one half the full fee was charged for a duplicate certificate, which was considered excessive. Under the amendment the minister can fix what he considers to be a reasonable fee.

GERMANY'S NAVAL PROGRAMME.

THE German programme of construction, according to the naval scheme for 1913 to 1917, is as follows:—For 1913, three large armored ships—one additional one replacing the Ersatz Woerth, and one armoured cruiser replacing the Hertha. For 1914, one armoured ship to replace the Ersatz Kaiser Friedrich II., and one armoured cruiser to replace the Viktoria Luise. For 1915, one armoured ship to replace the Ersatz Kaiser Wilhelm II., and one armoured cruiser to replace the Freya. For 1916, one second-class armoured ship added; one armoured ship in replacement of the Ersatz Wilhelm der Grosse, and one armoured cruiser replacing the Hansa. For 1917, one armoured ship replacing the Ersatz Kaiser Barbarossa, and one armoured cruiser replacing the Vineta. It will thus be seen that in the next five years, including this year's additional ship, there is the intention to lay down three additional ships, which will require six additional ships for the British Navy. It should be noted, too, that several of the new ships are so much greater in power than those they are to replace that it may be necessary to adopt some supplementary arrangement to augment our fleet of capital ships.

SAFETY IN BRITISH LINERS.

A QUESTION in the House of Commons recently, showed how almost absolutely safe Atlantic travel had been so far as British ships were concerned until the Titanic disaster. The President of the Board of Trade, Hon. Sydney Buxton, in reply to Mr. Fell, M. P. for Great Yarmouth, said: "The total number of passengers of all classes and nationalities carried outward and inward on board British and foreign ships between the United Kingdom and the United States and Canada (including Newfoundland) during the ten years ending December 21, 1911, was 6,053,382, of which the greatest proportion were carried in United Kingdom ships. The number of passengers reported to the Board of Trade as having lost their lives by casualties to vessels belonging to the United Kingdom (I cannot give those on other ships) on voyages between the United Kingdom and the United States and Canada during the period named, was nine."

Marine News From Every Source

British Columbia

Vancouver.—The tug Sea Wolf, owned and operated by Captain Brown, is a total loss at Port Moody, following a fire which broke out on the vessel and almost put an end to the career of the master and his crew. Prompt aid from the tug Annie enabled the towboat men to get away. The vessel is now on the beach at Port Moody and is covered at high tide. The Sea Wolf, valued at $6,000, was built in Vancouver for the Wilson Logging Company. In1908 Capt. Brown purchased the tug and had her remodeled. The prospects of salvage are very remote.

Vancouver.—So large are the British Columbia "toothpicks" being loaded aboard the British barque Kinross-shire, at the Canadian Puget Sound Lumber Co.'s mills, that it was found necessary to cut the vessel's stern ports in order that the heavy and cumbersome pieces of timber might be stowed. The British windjammer is taking out the largest sticks of timber that have ever left the B. C. coast. Some of these measure nearly three feet square and over seventy feet in length.

Vancouver.—The steam trawler Orontes, purchased in Glasgow by the Wallace Fisheries Ltd., for service on the Swiftsure Bank, reached port recently, after a passage of 209 days. The steamer had to make several calls for coal, and the ports at which she touched were Las Palmas, Montevideo, Coronel and San Diego. She was brought out by Capt. Kerr, who is well known on the British Columbia coast.

Vancouver. — The West Vancouver Transportation Co., has offered to transfer the whole of its ferry equipment to a new company for $75,000, stipulating that an adequate ferry service be maintained between Hallyburn and Vancouver. The West Vancouver council has recommended that the ferry company in course of formation accept the offer of the ferry steamers Sea Foam and West Vancouver, with all equipment, the same to be taken over and paid for as soon as the money by-law for that purpose has been carried and the municipality authorized to subscribe for shares in the company. A by-law is being prepared authorizing the issue of debentures for $30,000 to purchase 300 shares of $100 each in the company.

Vancouver.—Mr. W. H. Rourke, Vancouver, has received the contract for the construction of the new lighthouse tower to be constructed at Point Atkinson. The structure will be of concrete and about forty-five feet high. Total cost will be about $15,000.

Vancouver.—The C.P.R. has started work on a new concrete pier in the centre of its great wharf system here. The pier will be the finest in the present harbor, and will cost in the neighborhood of three-quarters of a million dollars.

Kamloops.—The rebuilt stern wheeler steamer Distributor, the largest craft that has yet been constructed at Kamloops for navigation on the North Thompson River, is about due to make her maiden trip up the river. The North Thompson is considered to be navigable for a shallow draught stern-wheel river steamer for about 100 miles above Kamloops, and on this initial trip the Distributor will go further if possible, in order to see how far it will be feasible for her to carry supplies and material for some of the large contracts which Twohy Bros. have along that portion of the river in connection with C.N.R. construction work.

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The Great Lakes

Detroit.—While being towed down by the steamer Robert Fulton, the barge Krupp ran aground on Ballard's reef, in the lower part of the river.

Casualty.—The steamer Frontier of the People's Steamboat Co., broke her shaft while crossing Lake Ontario recently, and as a consequence was out of commission for several days.

Presentations.—The staff of the old Niagara River Line of steamers, with the officers of the fleet, assembled in the dining room of the steamer Cayuga recently to honor their former manager, Mr. W. B. Folger. Mr. S. J. Murphy presided. Mr. R. H. McBride presented Mr. Folger with a handsome silver loving cup, while Commodore C. Smith followed this up by handing Mr. Folger a club bag. Mrs. Folger was not forgotten; Mr. James Woodward making a gift of a club bag to Mr. Folger for his wife. Short speeches were made by Messrs. J. V. Foy, J. M. Sullivan, H. Foster Chaffee, J. V. O'Donoghue, H. E. Weller and A. J. Mivella. Mr. Folger made a happy reply.

Parry Sound.—The steamer Arizona of the Goodrich Line made her first call here on June 26, being the beginning of a series of trips between Chicago and the principal ports of the Georgian Bay during the season. She carried a good list of passengers. In order to afford an opportunity of seeing the famous inside channel, passengers are landed at Collingwood and sent by rail to Penetang; there they embark on the Northern Navigation Company's steamer Waubie, and join the American boats here for the trip up through the north channel. Two boats of the Goodrich Line will call at Parry Sound weekly during the season. This new route promises to bring great number of Americans to view the beauties of the Georgian Bay.

Sarnia.—On June 26, the St. Clair River, just abreast of Staff Island, was the scene of a collision between two large freight steamers, as the result of which, the Bothnia is resting on the bottom of the river, and one of her crew, Ray Williams, who is said to have shipped at Sarnia, is drowned. The Bothnia left Sarnia with a cargo of copper sand. The steamer Currie was bound up the river and the two boats came head on together. The ship is owned and sailed by Captain Frank Lunin of Meaford.

Kingston.—The steamer Byron Whitaker, from Chicago to Prescott with corn, which went ashore at Salmon Point, west of Kingston, on July 5, was released by the Donnelly Wrecking Co., of this city. Part of her cargo was lightered, and she was easily floated without damage.

Brockville.—On the early morning of July 6, the steamer Columbia, a coal-carrying boat between Oswego and Montreal, was discovered on fire at Ogdensburg, where it is undergoing repairs. The craft is a total loss. The fire originated in the boiler room.

Coillingwood.—While crossing from Port McNichol to Owen Sound on July 4, the small passenger steamer Emma, owned by the Pratt estate of Parry Sound, was destroyed by fire. All of the crew were saved. The Emma was built in Collingwood in 1894 by Mr. S. D. Andrews, and has been engaged in the passenger business between Parry Sound, Depot Harbor and Rose Point for a number of years. Upon reaching Owen Sound the steamer was to provide a ferry service during July and August between that port and the King's Royal Park and other summer resorts in the vicinity.

Cornwall Canal. — Local rivermen point to the recent blockade in the Cornwall Canal caused by an oil-carrying steamer tearing away one of the gates, as a striking illustration of the benefit that would accrue from a parallel canal through the South Sault channel such as is proposed by the company seeking to develop power at the Long Sault Rapids. The canal was blocked for four days, causing a complete tie-up to the shipping interests. Upwards of twenty boats were held, the majority, with valuable cargoes, awaiting an outlet to the seaboard. Brockville shippers favor the Long Sault project because it will furnish an unlimited supply of reliable hydro-electric power for the whole of this eastern section, and because it will greatly improve shipping facilities on the St. Lawrence River. They have established that they can gain at least one full round trip additional each season between Montreal and the great Lakes in the event of the alternative route being constructed south of the Long Sault Rapids, because they will have but one lock to use instead of six in the Cornwall group of locks as at present.

Collingwood. — The steamer Turret Cape which has been in dry dock here during the past month, went out on the morning of July 2, and immediately cleared for Toledo to load coal.

Change of Vessel Name.—On account of registration difficulties, the name of the Merchants Mutual Line oil engine propelled freighter recently launched in Scotland, has been changed from "Indian" to that of "Fordonian."

Sault Ste Marie. — While passing through the channel in the early morning of July 8, the steamer Merida, bound down with ore, ran aground on the bank on the Canadian side owing to a dense fog. She will probably have to be lightered.

Collingwood.—The steamer Soo City brought word here recently of the destruction by fire of two tugs, the Agnes Smith, owned by Capt. S. Smith, and the Wayne Isabel, owned by Norman Trotter, both of Little Current. The Isabel was towing the Smith from Little Current to Sault Ste. Marie to go on the marine railway for hull repairs, and while passing through McBain's Channel, a short distance from Little Current, both tugs ran aground. Shortly afterwards, flames were discovered issuing from the hull of the Smith, and though the crew under Capt. S. Smith and Capt. J. May did their utmost to extinguish the flames their efforts proved unavailing, and both tugs were totally destroyed. The Agnes Smith was insured for $5,000, and the Wayne Isabel for $4,000.

Whitby.—A proclamation has been issued declaring the harbor of the Port of Whitby to be a public harbor.

Port Arthur.—The Western Drydock and Shipbuilding Company are getting ready to lay the keel of one of the several steamers they have under contract. For the past few weeks a number of vessels arriving from the east have discharged cargoes of construction material at the yards. The next steamer to be constructed in Port Arthur will be the freighter "Calgarian" to the order of the Merchant's Mutual Line.

Brockville.—The Montreal Transportation Company is having its share of ill luck during the present season. Following close on the accident to the tug Bartlett and barges Hamilton and Winnipeg, the tug Emmerson, commanded by Captain Lepine, while going down the north channel recently with a tow, swerved and struck the barge Hiawatha, loaded with coal. The barge sank. During the same week, the Nevada, of the Merchant's Line, struck another of the M. T. Co.'s boats and did considerable damage.

Sarnia.—The steamer Manistique of the Reid Wrecking Company, with a diver, jacks, steam pumps, air compressors, and a supply of dynamite, has been ordered to the steamer Viking, which is stranded at Split Rock, in Lake Superior. When the Viking stranded, a rock was forced through her bottom near No. 3 hatch, and it will have to be removed before she can be floated.

Sarnia.—Preparations towards blowing up the steamer Joliet, which lies in the way of navigation here have been made. It will be slow work, as no large charges can be used, because the wreck is nearly over the St. Clair tunnel.

Sault Ste. Marie.—For the first time in their history, the freight traffic through the Sault canals for a single month has passed the 10,000,000-ton mark; the record having been made in June, the statistical report for which has just been issued by Superintendent Sabin. The exact figures are 10,747,159 tons. The next largest month was July, 1910, when the traffic totalled 8,975,173 tons. In June, 1911, the freight traffic amounted to 7,476,097 tons. It is interesting to note that the amount of freight to pass the canals last month equalled that for the entire season of 1893, and is equal to the full amount passing through the canals for the first quarter of a century after the canal was opened. The passenger trade shows considerable falling off in comparison with the record of last year; the decrease being 2,324 to date.

Montreal and Quebec

Montreal.—Construction of a new lighthouse on the eastern extremity of St. Helen's Island has begun. The new structure will be ninety-three feet high from the top of the concrete foundation, making the light visible for several miles down the river.

Quebec.—The big contractors of the world do not seem to be anxious to undertake dry dock construction. The time allowed to put in bids for the construction of the Levis dock expired on July 3, and only one tender was received by the government. It is believed that the firm of Sir John Jackson is the lone tenderer.

Montreal.—The steamer Florida, belonging to the Canada Navigation Co., and plying between the Richelieu River and Montreal, caught fire from some unexplained cause on July 7, and the boat and nearly the entire cargo of cattle and produce is a total loss.

Montreal.—Only 54 ocean vessels arrived in port during the month of June as against 73 last month. The falling off was due to the British dock strikes. The Customs duties of the port, however, increased over those of the corresponding month last year, the figures being:—1912,$1,949,077; 1911, $1,562,173.

Quebec.—The Canadian Government Steamer Arctic, Commander Jackson, left on June 28 for a four months' trip in Hudson's Bay.

Maritime Provinces

New Incorporation.—The Standard Construction Company, Limited, is a new concern recently created under the provisions of the Nova Scotia Companies Act. It has been formed for the purpose of carrying on construction business of all kinds, including wharves, breakwaters, etc., and has acquired all the property of Reid & Archibald and Reid & Gould, as well as the good-will of both businesses. The Standard Construction Company also acquired the timber limits of MacNutt & Smith, and will operate and do business in timber

lands in addition to general construction work. The officers are George T. MacNutt, President; James E. Gould, Vice-President, and Roy A. Smith, Secretary-Treasurer.

St. Johns, N.F.—A collision with a whale on the Grand Bank, caused such serious damage to the two-masted schooner Empire, Oporto for St. Johns, that the vessel was abandoned. The accident happened on Thursday, July 2, and after keeping the vessel afloat two days the crew had to leave her when the pumps became chocked. The men rowed 120 miles toward land before they were picked up by a fishing schooner. The Empire was loaded with salt.

Charlottetown, P.E.I.—The schooner Nellie M. Swan, while on her way from Murray Harbor to New London Harbor, capsized during a heavy electrical storm on July 4. Captain Blakely and Colin Bert, aged 23, a native of Seaview, P.E.I., were on board. Blakely got into a dory which was washed off the deck. He rowed nine miles and reached land safely, but in an exhausted condition. Bert is missing, and is supposed to be drowned. The accident occurred off the East Point.

Charlottetown, P.E.I. — The Island Tug Co., Charlottetown, has appointed the following officers to its vessels for the current year:— "Fred M. Batt," captain W. P. Bourke, chief engineer W. McEachren; "Harland," captain J. T. McLainet, chief engineer A. Roebuck; "Islander," captain G. Batt, chief engineer, J. Stewart.

Newfoundland.—The Reid-Newfoundland Co., has ordered two steamships, one of which will be operated in the daily service between Port aux Basques and North Sydney, N.S., with the company's new steamship Bruce, replacing the SS. Invermore. The other will be run on the Labrador service. Both vessels are being built to class 100 A1 at Lloyds, with special strengthening for ice. The first vessel, that for the Port aux Basques-North Sydney service, will have accommodation for 78 first and 160 second class passengers, and will be of the following dimensions — Length between perpendiculars, 255 ft.; breadth, 37 ft.; and depth moulded to shade deck, 24¾ ft. She has been designed to carry about 800 tons on a 17¼ ft. mean draught, at speed of 15 knots an hour. The contract calls for delivery by Jan. 31, 1913. The vessel for the Labrador service will have accommodation for 68 first, and 140 second-class passengers, with extra accommodation for 18 persons in hospital. Her dimensions will be, length between perpendiculars, 220 ft.; breadth, 32 ft.; depth moulded, 20½ ft. She will have a speed of 13 knots an hour. The contract calls for delivery by Apr. 15, 1913.

Great Britain and Ireland

Large Turbines.—One of the largest sets of propelling machinery yet made on the Clyde has just been completed by Messrs. John Brown & Co., Clydebank, for the battle cruiser Queen Mary, being built by Palmer's Shipbuilding Co., Jarrow-on-Tyne. The installation consisting of Parsons turbines driving 4 shafts, and of about 70,000 h.p., has been shipped. At one time large turbines were handled in pieces, and lowered into their places in the holds of vessels, section after section, but now nearly all the firms engaged in this class of work have specially powerful cranes, and the turbine is frequently lifted complete from the dock-side into the vessel. In the days when the reciprocating engine was supreme, the boilers were the heaviest lifts which had to be handled, but now these are always exceeded in weight by the turbines to which they supply steam.

Glasgow Harbor.—The Clyde Navigation Trustees have now obtained delivery of nearly all the new vessels which they ordered from Renfrew builders and also of the tug for which they placed the contract. The new dredger Rosslyn has just been set to work. The trustees are now owners of six large dredgers, two steam diggers, two diving bell barges, 14 hopper barges of 1,200 tons capacity, two of 1,000 tons, and six of 400 tons; three high level ferry boats, six chain ferry boats (not all in regular use), 12 steam passenger ferries, the tug Clyde, the small steam yacht Comet, and one small service steamer. In addition they have over 200 small, non-propelling craft.

Belfast. — Rapid progress is being made in the construction of the huge new White Star liner at Messrs. Harland & Wolff's Works, Belfast. Every effort is being made to expedite the completion of the vessel, which will be nearly 20 feet longer than the Titanic. It is reported that her plans have been suitably altered, especially with regard to the adoption of lateral bulkhead in addition to the transverse bulkheads used in the Titanic, and, indeed, all ocean-going liners. She will not be completed for over a year, and it will, therefore, be possible to fit her with all the resources in the way of boats and life-saving appliances deemed necessary in view of the loss of the Titanic.

Belfast.—It is announced here that the new 50,000-ton White Star liner, which will take the place of the Titanic in the fall of 1913, is to be named "Brittanic." Two vessels bearing the name Brittanic earned large sums for the company, and the name is considered lucky.

Glasgow.—In connection with the coming celebration of the centenary of steam navigation in Great Britain, the Governors of the Royal Technical College, Glasgow, propose to apply to the Admiralty for the steam yacht Vivid as a free gift in order that they may inaugurate with that vessel, as a memorial of the centenary, a scheme of sea-going training for engineers and sailors. The Vivid, which is the property of the Admiralty, is a vessel of 550 tons, and is at present for sale at Devonport. She was built on the Clyde in 1883, and has inverted compound engines of 425 i.h.p., natural draught, and a steel, cylindrical, tubular boiler tested up to 160 lbs. If this or any other steamer is obtained, the summer session of the College, from April to September, will be spent afloat by engineering and nautical students, who will perform, so far as possible, all the executive duties required on sea-going cruises.

Londonderry.—After three weeks' negotiations, a provisional agreement has been entered into between the Londonderry Harbor Commissioners and a company of shipowners and shipbuilders in England, for the leasing of Londonderry Shipyard which has been lying derelict for nearly ten years. The company is known as the North of Ireland Shipbuilding Co., and the first directors are Mr. Treviza Clarke, of Liverpool, managing director; Mr. J. Weir Johnston, barrister, of Londonderry, and Mr. John Expler, of Liverpool. The capital is $250,000. It is understood that the company has been offered over 17 acres at a merely nominal rent, together with the use of a 60-ton crane, graving dock, etc., and that the work of refitting the yard will begin at once.

United States

New York.—Five vessels which passed through New York bay on Saturday, May 4, are said to have contained life-saving equipment, life-boats and rafts that, previous to the Titantic calamity, would have been considered sufficient in quantity for twice their number. The poor martyrs to mismanagement and something worse have evidently not died in vain. It was a terrible price to pay, but at least they have stirred humanity to the point that life on the sea must receive the attention that passengers in the steamship offices receive —when they call there to buy transportation. Far greater results, however, must accrue from the grief.

U.S. Steel Corporation.—The United States Steel Corporation through Chairman E. H. Gary has presented the American Museum of Safety, 29 West

Thirty ninth street, New York City, with the sum of $5,000 to be used for obtaining a permanent collection of the best devices for saving life at sea, which will be made a public exhibit for study and inspection.

Washington.—All ocean steamers entering American ports in future must be equipped with life-boats sufficient to carry at any one time every passenger and member of the crew, according to new regulations adopted by the steamboat inspection service and approved by Secretary Nagel. In the case of coastwise, lake, bay and sound steamers, lifeboats for all aboard must be carried except from May 15 to September 15 when travel is comparatively safe. During that period coastwise steamers must have life-saving capacity for at least 60 per cent. of those on board; and lake, bay and sound steamers for at least 30 per cent. In the case of the latter class of vessels, also, provision need be made for only 10 per cent. of the passengers and crew if the boats do not go farther than five miles from land or do not navigate in waters deep enough to cover the vessel in case of disaster. River steamers are required to have lifeboat accommodation for 10 per cent. of those aboard. A certain percentage of the lifeboat or raft equipment, varying with the class of vessel must be approved by the steamboat inspection service.

Detroit.—United States steamboat inspectors have cut down the passenger-carying limit of the Detroit excursion steamers by one-third. This action follows the loss of the Titanic and is made in an effort to keep the number of passengers on excursion boats down to a limit where they could better be handled by life-saving equipment aboard. Excursion men have raised a strenuous protest. They point to the fact that out of 12,000,000 passengers carried on lake boats last year only one life was lost, that of a man who committed suicide. Profits will be seriously cut. The steamer Put-in-Bay, which plies between Detroit and Lake Erie ports, allowed to carry 1,100 people last year, was this year limited to 900. Marine men declare the action is unwarranted, as practicaly nowhere on the routes are they in water deep enough to submerge the entire boat. Practically always, they are within sight of land or other boats.

Washington, D. C.—By a vote of 147 to 126 the House of Representatives reaffirmed its decision that no toll should be charged American vessels engaged in coastwise trade for passage through the Panama Canal.

Newport News. — The battleship Texas, greatest of the super-dreadnoughts constructed for the United States navy, was successfully launched on May. 18. The Texas with all of her stores aboard will displace 28,367 tons. She is 573 feet long.

Ashland, Wis.—Two hundred and fifty thousand tons of ore have been contracted for, to be shipped from Ashland this season to Canadian ports. This is more than twice as much as has ever gone to Canada in any previous local season. The ore trade from Lake Superior is still hampered by the grain trade from Fort William and Duluth. So great has been the rush of boats that many of them have had to wait for cargoes nearly a week at these two ports before getting dock room, and have also had to wait nearly as long at Buffalo before getting a chance to discharge.

American-Hawaiian Steamship Co.— The five new liners being built for the the American-Hawaiian Steamship Co., says a New York contemporary, will be named Pennsylvania, Panamanian, Minnesotan, Montonon, and Dakotan. The Pennsylvanian and Panamanian will be added to the Pacific service, and the others will go to the Atlantic. At the opening of the Panama Canal the steamers will go through to the Pacific Coast. In addition to the five vessels building, there are three others in prospect, which may be ready before the opening of the Canal. Not including the three boats in prospect, the fleet of the American-Hawaiian Steamship Co., has a tonnage of 224.00 tons, all built in the States.

Cleveland.—The Pittsburg Steamship Company has sold to O'Brien & O'Gorman of Toronto, the steamer Maruba and barge Malta, and to the Lakewood Steamship Company, of which Charles Hutchinson is manager, the steamer Corsica. These vessels are among the oldest of those owned by the corporation and make a total of six boats that have been sold within a year. The three steamers previously sold are the Marina, Corona and Masaba. They are now owned by Canadian parties. The Masaba was shortened.

Detroit. — The steamers Crete and Dunham came together in a collision in the St. Clair River at the southeast bend. The Crete, down bound with ore went on to Toledo, where she will be repaired. Five plates and eight frames will have to be renewed. The Dunham, a Canadian boat, was only slightly damaged, and proceeded up with her cargo of coal. The scene of the accident is not far from where the Bothnia was sunk by the Curry.

Boston.—Claims against the Newfoundland Government for light dues, duties, etc., paid by Gloucester fishing schooners in Newfoundland ports on the treaty coast will be filed with the State Department at Washington shortly, and many of them, if not all, will come before a Commission in the fall. The claims amount to over $60,000, some ranging as high as $10,000. Much interest is being manifested in the outcome of the case, for in the event of the petitioners being successful, other claims will be filed, it is stated.

Crown Point, N.Y. — The memorial lighthouse, to commemorate the tercentenary of Samuel de Champlain's discovery of the lake which bears his name was unveiled at Crown Point on July 6, with impressive ceremonies, which were preceded by the unveiling of tablets at Forts Frederic and Amherest.

Duluth, Minn.—The big freighter Biking of the Merida Steamship Co., Cleveland, was beached on Split Rock, in Lake Superior on July 6, to prevent her from sinking. During a dense fog the vessel struck an uncharted rock and a big hole was punched in her bow. Captain Pierce decided to run her on the beach, so rapidly was she making water. The Viking was bound from Duluth to Port Arthur with lumber. The crew remained aboard.

Detroit.—The steamer Sydney C. McLouth was burned to the water's edge, 20 miles off Green Bay, Lake Michigan, on June 28. All of the crew of fifteen escaped unhurt. The vessel was owned by Sidney McLouth of Marine City. She was 267 feet in length, and was built in 1880.

Washington.—The Naval Appropriation bill, carrying $133,609,674 and two battleship provision, was passed by the Senate on July 5. It now goes to conference with the House to thresh out the naval increase program and other Senate amendments. Senator Johnson, of Alabama, proposed a substitute provision for one battleship, and gave notice that he would propose, when the Panama Canal administration is considered, to deny the use of the canal to all nations which do not agree to build but one battleship a year. He said the United States should end the wasteful battleship competition with Europe by entering into treaties with them to cease building such vessels. The Johnston one-battleship provision was rejected by 43 to 12.

Pittsburg.—The Pittsburg S. S. Co., of which Capt. W. W. Smith is superintendent, has leased a number of big pumps from the Trotter Towing & Wrecking Co., for wrecking purposes on the steamer Joliet, which is sunk in the St. Clair River, near Sarnia, Ont.

Cleveland. — "Far from being a movement by vessel owners to secure better tug service," said United States Attorney U. G. Denman, in opening the Government's suit against the Great Lakes Towing Company, as an alleged towing trust, "the organization of the company was a deliberate plan to create

a monopoly.'' Competition was smothered, Denman declared, when five of the largest towing companies on the Great Lakes were absorbed. Thirty individual officials and twenty-two companies are defendants in the suit, the arguments in which have been heard.

General

Sydney, N.S.W.—In Sydney considerable surprise and regret is being expressed at the alleged Canadian policy offering Dreadnoughts to the Imperial navy instead of following the Australian precedent. Such a policy is entirely disapproved, and there is a growing feeling amoung those interested in Pacific problems that the most advisable course is to concentrate Australian, New Zealand and Canadian forces by the creation of an Imperial Pacific fleet, leaving Britain to control the Atlantic. The Premier recently stated that he welcomed a proposal of thorough co-operation on such lines, and had taken the steps to secure that consummation.

Suez Canal Receipts.—An increase in the receipts of $866,000 over the preceding year was reported at the annual meeting of the Suez Canal Company recently. The total receipts for the year were $27,762,000. This, it was announced, justified a reduction in the tariff on vessels, which will again be lowered next January. Although business with China was hampered by political conditions, the export trade with India and the Dutch Indies showed an increase, while Japan extended her commercial relations with Europe.

Cape Town. — The British steamer Canada Cape, from St. John, N.B., previously reported as having been beached because of a fire aboard which was afterwards extinguished, has been refloated and docked.

Canada's Offer Appreciated.—While the British cruiser Cornwall was engaged in assisting the Niobe of the Canadian Navy, she suffered damage. The Canadian Government instructed the High Commissioner in London to inform the Admiralty that Canada wished to bear the expense of repairing the Cornwall. A House of Commons return just published contains the reply to the effect that the repairs would be paid out of Imperial Funds. Their Lordships of the Admiralty, however, placed on record their high appretion of Canada's generous and courteous offer.

Oil Depots. — Seven new oil depots it is announced, will be opened on the west coast of South America on or about July 1 for the use of oil burning steamships and internal combustion craft. Other stations are soon to be established on the South American Atlantic coast, and it will then be as convenient for a ship to find oil on her voyage arousd the Horn as it now is to find coal. The new stations will be at Taltal, Tocopilla and Iquique, Chile; and Junin, Pisaqua, Callao and Paita, Peru. These will supplement existing stations at Tacoma and other Puget Sound ports, San Francisco, Los Angeles harbor, San Diego, Panama and Valparaiso.

Japan.—The annual report of the Mercantile Marine Bureau, Tokio, for the year 1910-1911, recently issued, states that there were at the end of the year 2,545 steamers of 1,233,909 tons, and 6,392 sailing vessels of 413,720 tons registered and unregistered. Compared with the preceding year this was an increase of 179 steamers of 35,715 tons and of 455 sailing vessels of 9,631 tons. The shipbuilding yards, which numbered 230 at the end of the year, showed a decrease of nine. These yards turned out seventy-seven steamers of 24,476 tons and 147 sailing vessels of 11,097 tons. During the year 408 steamers and 255 sailing vessels met with disaster. Over 50,000 vessels entered the open ports. A list of the vessels built under the ''Shipbuilding encouragement law'' is included in the report.

Jamaica. West Indies.—It is reported that a British Naval Commission will visit Jamaica soon with a view to investigating and reporting on the advisability of reopening the dockyard to cope with the situation caused by the completion of the Panama Canal. Should the Commission report favorably, the dockyard establishment will be enlarged in connection with a scheme of the Admiralty to make Jamaica a naval base.

French Atlantic Record.—The new steamer France, on her first eastward trip, made the passage from Sandy Hook in five days nineteen hours and forty-eight minutes, beating by seven hours the previous record, held by La Provence since June 6, 1906.

R.C.Y.C. FERRY STEAMER.

THE accompanying illustration shows the steel ferry steamer recently completed by the Polson Ironworks, Ltd., Toronto, for the Royal Canadian Yacht Club. The vessel, as will be noted, has a smart appearance afloat, and will be an acquisition to the fleet of pleasure craft whose headquarters are in Toronto Bay. The leading dimensions and particulars of her machinery are as follows: Length overall, 70 feet, beam molded, 15 feet; depth molded, 6 feet 2 inches; draft aft, 4 feet. The engines are of the compound jet condensing vertical inverted type, having cylinders of 7 and 14 inches diameter by 10 inches stroke, running 150 revolutions per minute and developing 75 i.h.p. with steam pressure of 160 pounds per sq. inch generated in a 51 x 84 x 84 inch Fitzgibbon marine type boiler. The speed of the vessel is 10 miles per hour.



ROYAL CANADIAN YACHT CLUB FERRY STEAMER.

INTERNATIONAL CONGRESS OF NAVIGATION.

AN important question considered by the Ocean Section of the International Congress of Navigation held recently at Philadelphia, was that of ''Dimensions to be given to Maritime Canals, and Probable Dimensions of Seagoing Vessels of the Future.'' Upon this subject, six papers were submitted by the following gentlemen:—G. De Thierry, Berlin, Germany; H. Vander Lin, Antwerp, Belgium; E. L. Corthell, New York; J. Foster King, Glasgow, Scotland; C. Leemans, Amsterdam, Holland; E. I. Zamjatin, St. Petersburg, Russia.

General Report.

The general report was prepared by C. E. Grunsky, of San Francisco, who submitted the following conclusions for the consideration of the section:—

1.—It is desirable that a limit be set to the draught of sea-going vessels.

2.—Government aid should not be extended to the building or operation of sea-going vessels whose draught exceeds 9.5 metres (32-2 feet).

3.—There should be an International Agreement fixing the maximum dimensions of sea-going vessels built or operated under Government subsidy, and there are tentatively suggested the following:—Length over all, 900 feet (275 metres); breadth, 105 feet (32 metres); draught, 32-2 feet (9-5 metres).

4.—Any Maritime Canal, which has locks with a usable length of 1,000 feet (305 metres), a width of 110 feet (33-6 metres), and a depth of water on the sill of 36 feet (10-7 metres), will fulfil every reasonable requirement of commerce.

5.—In a Maritime Canal, a wet section five times as large as the immersed portion of the largest ship which is to use the canal is desirable, as also a depth of one metre under the keel; but these values, being functions of the speed at which the canal is to be navigated, and, therefore, to some extent also of the volume of commerce are to be determined by local conditions.

Limiting Vessels' Dimensions.

The conclusions of the general report evoked the liveliest interest, Mr. Corthell, the chairman, opening the discussion. Mr. Corthell pointed out that it would be extremely dangerous to adopt the conclusions as made by Mr. Grunsky, because England would undoubtedly resent them. In fact, England had no representative at the second section, not yet having subscribed to the section on ocean navigation. He felt that the attitude of England towards the congress would be extremely hostile if Mr. Grunsky's conclusions were endorsed.

J. Foster King, chief surveyor for the British Corporation, Glasgow, Scotland, who attended the meeting, not as a representative of Great Britain, but as a delegate from the Institute of Naval Architecture, said, "I feel that if this Congress adopts a resolution which contemplates limiting ships to 900 feet in length it would perform an inadvisable and injudicious act, to say the least. You cannot stop the progress of nations by resolutions, and you do not want to discredit your great organization by putting yourself on record as desiring to stop the growth of ships at this arbitrary point. Great Britain has studiously declined to have anything to do with this feature of the Congress, believing that any imposition of limitations on the size of ships would be in restraint of British trade. It was the declaration of Mr. Corthell that the Titanic disaster would have been even more appalling in the proportion of lives lost had the ship been smaller. Many people think, he said, that the sinking of the Titanic and the terrible loss of life resulted from the immense size of the ship, when as a matter of fact the majority of naval architects are agreed that had the ship been smaller the loss of lives would have been greater in proportion to the number of persons aboard."

Mr. Corthell read a number of letters from naval architects, one from Lewis Nixon, who declared that the safety of the ship increases with its size.

"I am opposed to the resolution limiting the size of the ships," said C. Leemans, Amsterdam. "So long as it is economic to move freight in large quantities, the right to build large ships for the carriage of this freight must be observed. The function of our Congress is to promote and not to restrain navigation."

G. de Thierry, Berlin, also differed with Mr. Grunsky. "Some day," said he, "there will come a time when economical reasons will set a limit to the size of ships, but I don't believe that it will be soon. I think our efforts will end in failure if an attempt to regulate the size of vessels is made by this Congress. If economical reasons call for the increase in size of ships, then any action hostile to this growth taken by the Congress will be absolutely worthless."

The speaker moved to put the limit of the size of vessels out of consideration at the present session of the Congress, taking up only the question of the size of canals, but this motion was replaced by one from Mr. Corthell, who moved that the first four paragraphs of the conclusions set down by Mr. Grunsky be struck out, and only the fifth one relating to the size of canals be accepted as the sentiment of the Congress. This was unanimously carried.

PARS FROM CURRENT LITERATURE.

A tugboat engineer visited the engine-room of a large ocean steamer. One of the engineers on watch showed him around and explained the operation of various devices. Stopping at the gauge board, where all of the needles were pointing to zero, the visitor looked at the vacuum guage and said:

"What vacuum do you carry?"

"Anywhere from 24 to 26 in.," the engineer replied.

"Gee!" said the tug man, "is that all?"

"How much did you think we ought to carry?"

"Why we carry 24 on my little tug, and I thought a big ship like this would carry at least 40."

* * *

Canadian statesmen should be ashamed to show their noses at the reviews of a navy to which Canada contributes nothing but punk speeches and useless local flotillas.

* * *

Senator Smith, in the report of the American inquiry into the loss of the Titanic, made a suggestion that ships should in future carry buoys "to mark the spot of their burial" when they foundered. Strangely enough the report had only been published a few days when the inquiry into the sinking of the French submarine Vendemiaire showed the futility of the proposition. This vessel went down close to the land and lay in 26 fathoms of water. Her disappearance was witnessed by a whole fleet of warships, and immediate steps were taken to locate the wreck with a view to possible salvage. Yet, owing to the currents which prevail around the spot, the wreck has drifted away, and it is not known where she now lies. This in 26 fathoms! The depth of water over the Titanic is enormously greater. A sentimental interest alone could be served by carrying out such a suggestion.

* * *

Now that Mr. Pelletier has seen the greatest fleet in the world manned by seamen who enlist voluntarily, he will probably not be so greatly afraid that Britain will "force" the youth of French Canada aboard her warships and and send them to fight the Empire's battles overseas.

* * *

The greatest depth of the sea hitherto measured—namely, 32,099 feet, was ascertained by the survey ship Planet in her last journey from East Asia to the South Seas, at a point 40 knots distant from the northern coast of the Philippine Island, Mindanao.

* * *

The failure of Rt. Hon. R. L. Borden & Co., to see any of Canada's Dreadnoughts at the review of the fleet which guards the Empire's safety will not be due to defective eyesight.

* * *

During 1911 as many as 422 rocks and shoals dangerous to navigation were reported in various parts of the world. Of these 13 were discovered by vessels striking them; 108 were reported by the British Admiralty surveying ships, and eight by other of H.M. ships.

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ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals who Have Been More or Less Prominent in the Marine Sphere

Captain James Howard, for many years Dominion superintendent of dredging, has resigned and will for the future act in a consulting capacity.

* * *

Mr. T. H. Switzer, mechanical engineer in the Government Printing Bureau, Ottawa, has been appointed Dominion superintendent of dredging.

* * *

Mr. George M. Arnold, has been appointed Government inspector at Toronto, in connection with the enforcement of the regulations concerning number of passengers carried on lake passenger vessels.

* * *

Mr. Vincent Ward, one of the joint managers of the Montreal branch of the New Zealand Shipping Company, and a son of Sir Joseph Ward, ex-premier of New Zealand, has been appointed agent for his native country in Canada.

* * *

Col. Geo. W. Goethals, Chairman and Chief Engineer of the Isthmian Canal Commission, was given the honorary degree of Doctor of Science at Columbia University at the annual commencement.

* * *

George W. Dickie, ship designer, of San Francisco, will be located at the yard of the New York Ship Building Co., Camden, N.J., for the next year superintending the building of ships for the Pacific Coast Co.

* * *

Capt. Alex. McDougall, president of the Collingwood Shipbuilding Co., spent a few days in Collingwood. Speaking of the shipbuilding outlook he said the prospects of his company were never so bright. Already they had considerable work on hand and much more was offering.

* * *

Capt. Lugar has been appointed acting chief examiner of masters and mates, to succeed Captain Lindsay.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont., Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street ,Kingston, Ont.; Captain T. J. Murphy, 111 William St., Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy St., Kingston, Ont.; Captain James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rideau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

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Thos. Theriault, Levis, P.Q., Grand Vice-President.
Neil J. Morrison, P.O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
Jno. A. Murphy, Midland, Ont., Grand Conductor.
George Bourret, Sorel, P.Q., Grand Doorkeeper.
Richard McLaren, Owen Sound, Ont.
L. B. Cronk, Windsor, Ont.
Grand Auditors.

W. S. Jackson, late of the Collingwood Shipbuilding Co., is reported to have been appointed superintendent of the Government shipyards at Sorel vice L. J. Papineau, resigned.

* * *

Captain H. St. G. Lindsay, Ottawa, has been appointed acting wreck commissioner to succeed Capt. Demers, recently appointed harbor master at Montreal.

* * *

Mr. George B. Crow, for close upon 60 years a prominent figure in the shipping and commercial life of Liverpool, England, died at his residence there on June 15, in the 91st year of his age. Deceased was born and educated in Truro, Nova Scotia.

* * *

Mr. C. C. Ballantyne, Harbor Commissioner, Montreal, sailed for England on June 21, in order to be present at the launch of the new floating drydock being built by Vickers, Limited, Barrow-in-Furness, for installation in Montreal harbor. The launch is expected to take place about July 15.

BRITAIN'S NAVAL PROGRAM.

THE main British navy estimates for the fiscal year 1911-12 amounted to $221,962,500, an increase of $18,940,000 over the previous year. Of this amount $66,626,160 was set aside for the completion of ships under construction, and $8,693,225 for commencement work.

Capital ships	5
Protected cruisers	4
Destroyers	20
Submarines	6
River gunboats	2
Depot ship for destroyers	1
Hospital ship	1
Total	39

Directory of Subordinate Councils for 1912.

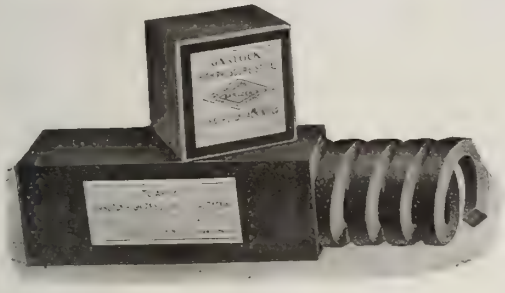
Name	No.	President.	Address.	Secretary.	Address.
Toronto,	1	A. J. Fisher,	490 Concord Ave.	E. A. Prince,	61 Elm Grove, Toronto.
St. John,	2	J. F. Matthews,	50 Douglas Ave.,	G. T. G. Blewett,	65 Harrison St., St. John, N.B.
Collingwood,	3	Andrew Kerr,	Box 343, Collingwood,	Robert McQuade,	P.O. Box 97, Collingwood,
Kingston,	4	A. E. Kennedy,	395 Johnston Street,	James Gillie,	101 Clergy St., Kingston, Ont.
Montreal,	5	A. F. Hamelin,	3208 Le Tang Street,	O. L. Marchand,	St. Vincent de Paul, P.Q.
Victoria,	6	Alex McNiven,	P. O. Box 234,	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver,	7	A. S. DeGruchy,	Room 23, Williams Bldg.,	E. Read,	859 Thurlow St.
Levis,	8	Helaire Mercier,	Bienville, Levis.	Jules Lecours,	Bienville, Levis, P.Q.
Sorel,	9	Geo. Bourret.	Sorel, P.Q..	Al. Charbonneau.	P.O. Box 132, Sorel, P.Q.
Owen Sound,	10	H. W. Fletcher,	636 4th Ave. East.	E. J. Riley,	1030 1st Ave., Owen Sound, Ont.
Windsor,	11	Alex. McDonald,	Windsor, Ont.,	Neil Maitland,	221 London St. W., Windsor, Ont.
Midland,	12	Jas. Silverthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
Halifax,	13	D. J. Murray,	Victoria Rd., Dartmouth,	Chas. E. Pearce,	Portland Street, Dartmouth, N.S.
Sault Ste. Marie,	14	Thos. O'Reilly,	Sault Ste Marie,	Geo. S. Biggar,	Sault Ste Marie, Ont.
Charlottetown,	15	J. K. Sutherland	Charlottetown, P.E.I.,	Lem Winchester,	302 Fitzroy St., Charlottet'n, P.E.I.

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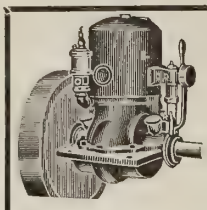
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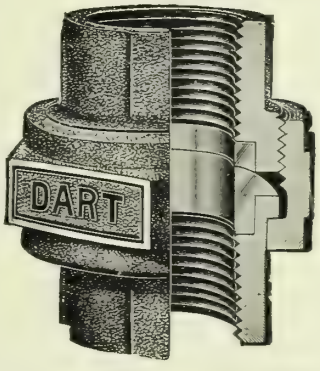
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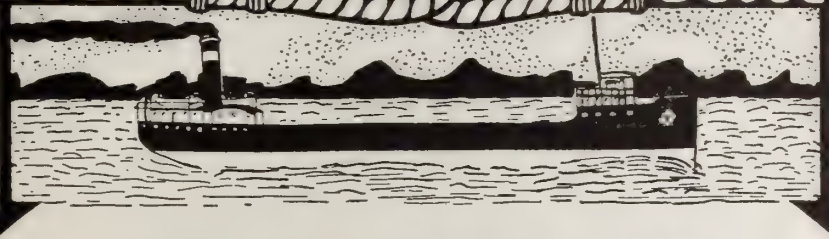
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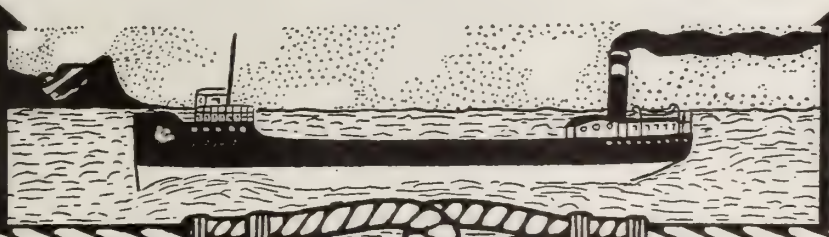
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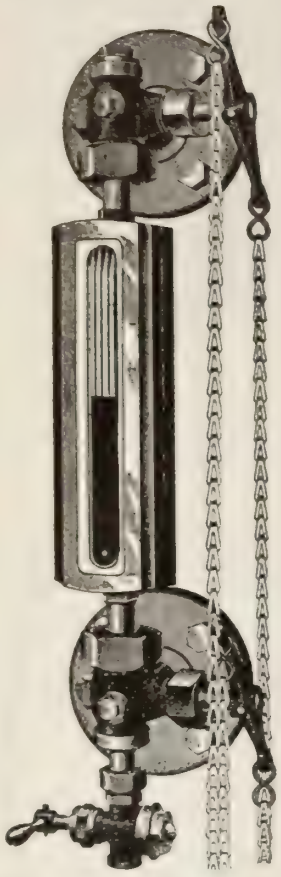
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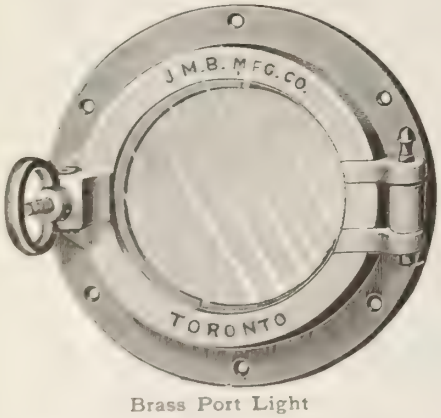
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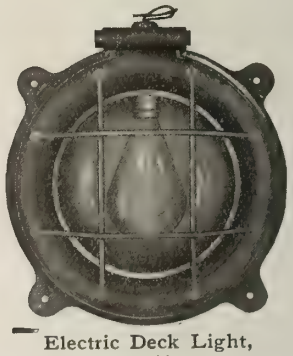


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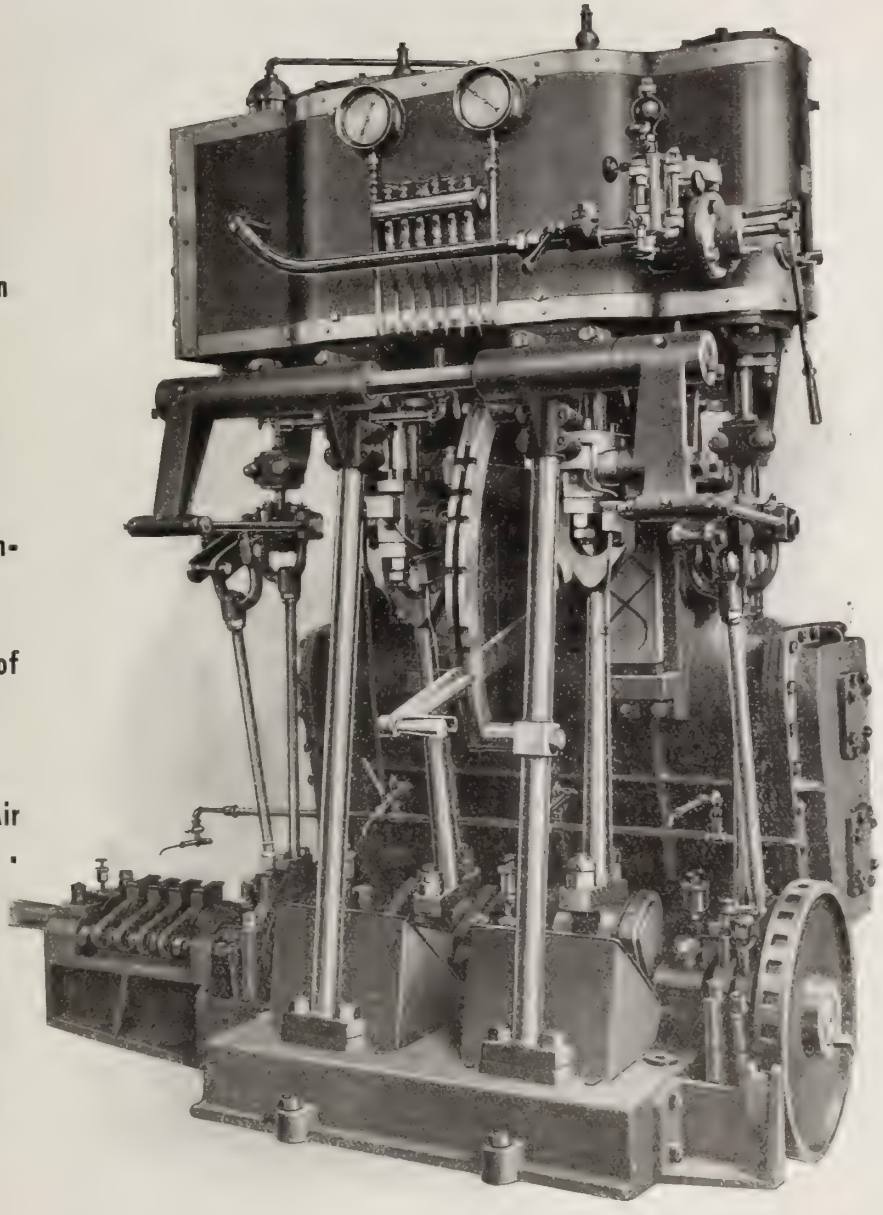
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STEAMERS—					
F. W. Gilchrist	416	50	7,000	4	
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R. E. Schuck	416	50	7,000	4	
R. L. Ireland	416	50	7,000	4	
H. S. Sill	416	50	7,000	4	
L. Woodruff	416	50	7,000	4	
Fleet No. 2—					
F. J. Hecker	464	50	8,000	4	
G. H. Russel	464	50	8,000	4	
Fleet No. 3—					
John Sherwin	514	54	10,000	4	
Jas. B. Wood	514	54	10,000	4	
Fleet No. 4—					
Gilchrist	356	50	6,000	3	
Fleet No. 5—					
G. A. Garretson	520	54	10,000	4	
H. P. McIntosh	520	54	10,000	4	
Fleet No. 6—					
Lake Shore	356	50	6,000	3	
Fleet No. 7—					
Jupiter	346	48	5,500	3	
Venus	346	48	5,500	3	
Saturn	346	48	5,500	3	
Uranus	346	48	5,500	3	
Mars	346	48	5,500	3	
Neptune	346	48	5,500	3	
Fleet No. 8—					
F. M. Osborne	380	50	6,500	4	
Frank W. Hart	380	50	6,500	4	
Steel King	380	50	6,500	4	
E. N. Saunders	380	50	6,500	4	
C. W. Watson	380	50	6,500	4	
Fleet No. 9—					
D. M. Whitney	412	51[5]	7,000	4	
E. W. Oglebay	375	45[8]	5,000	3	
Merida	360	45	5,000	3	
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Vulcan	260	38	2,800	3	*23-24ths.
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Christening Montreal's Floating Dock at Barrow-in-Furness

By C. T. R.

This function was notable in many respects. The occasion, the Canadian guests, and the special circumstances which made possible the presence of prominent members of Canada's federal cabinet combined materially to foster and strengthen the relationship existing between the Motherland and its intensely progressive Premier colony. Perusal of the detailed proceedings here recorded cannot but impress the reader with a conception of far reaching and mutually beneficial results to accrue in the coming time.

MONTREAL DRYDOCK.

IN view of the important work done by Messrs. Vickers, Limited, for the British and Foreign Navies, and of the admirable character of the organization of their works at Barrow-in-Furness, as well as in view of the proposed Vickers works in Canada, the members of the Canadian Government now in England to confer with the Imperial Government, decided to visit the Barrow-in-Furness works. Unfortunately, an important engagement prevented the Prime Minister, the Honorable R. L. Borden, and Mrs. Borden from participating in the visit, but the other members of the Ministerial party from the Dominion, with others interested in Canada, traveled from London in a special train to Furness Abbey Hotel.

Participants of the Visit.

Amongst the Canadian visitors were:—Hon. J. D. Hazen, Minister of Marine, and Mrs. Hazen; Hon. C. J. Doherty, Minister of Justice, and Miss Doherty; Hon. L. P. Pelletier, Postmaster-General, and Mrs. Pelletier; Mr. G. J. Desbarats, Deputy Minister of Naval Affairs; Dr. Guerin, ex-Mayor of Montreal; Admiral and Mrs. Kingsmill; Mr. and Mrs. C. C. Ballantyne; Mr. J. T. Hackett, Secretary to the Minister of Justice; Mr. G. Heidmann, Secretary to the Minister of Marine; Mr. and Mrs. F. Orr Lewis, Mrs. Grant, Mrs. W. Beardmore, Colonel John Hughes, Miss McKeand, Dr. Hackett, Mr. and Mrs. James R. Nelson, Mrs. R. C. Smith, Mr. McArthur Smith, Mr. C. B. Reilly.



THE HON. J. D. HAZEN
Dominion Minister of Marine and Fisheries.

Sir Trevor Dawson and Sir Vincent Caillard traveled from London with the party, as representing the Vickers company, and the visitors were received on their arrival at Barrow by Mr. James McKechnie, Mr. Archibald Miller and Mr. James H. Boolds, on behalf of the company.

The day following their arrival being Sunday, the party embraced the opportunity of viewing the scenery on the Lake district, and needless to say, all were charmed, not only with the grandeur, but also with the great variety of the scenery.

Christening the Floating Dock.

On Monday, the guests were at the works early, and at once proceeded to the large floating dock which Messrs. Vickers have constructed for their new Canadian establishment at Montreal.



MONTREAL'S FLOATING SHIP DRY DOCK, "THE DUKE OF CONNAUGHT."

The dock was formally named the "Duke of Connaught" by Mrs. Hazen, wife of the Minister of Marine. The party were gathered on the top deck of one of the side walls, and the christening bottle was suspended by a cord stretching across the dock, so that when released it struck the opposite wall. Mrs. Hazen, in naming the dock, expressed the hope that it would carry safely to Canada a message of friendship, and that on the dock many links of Empire would be welded and strengthened.

Floating Dock Particulars.

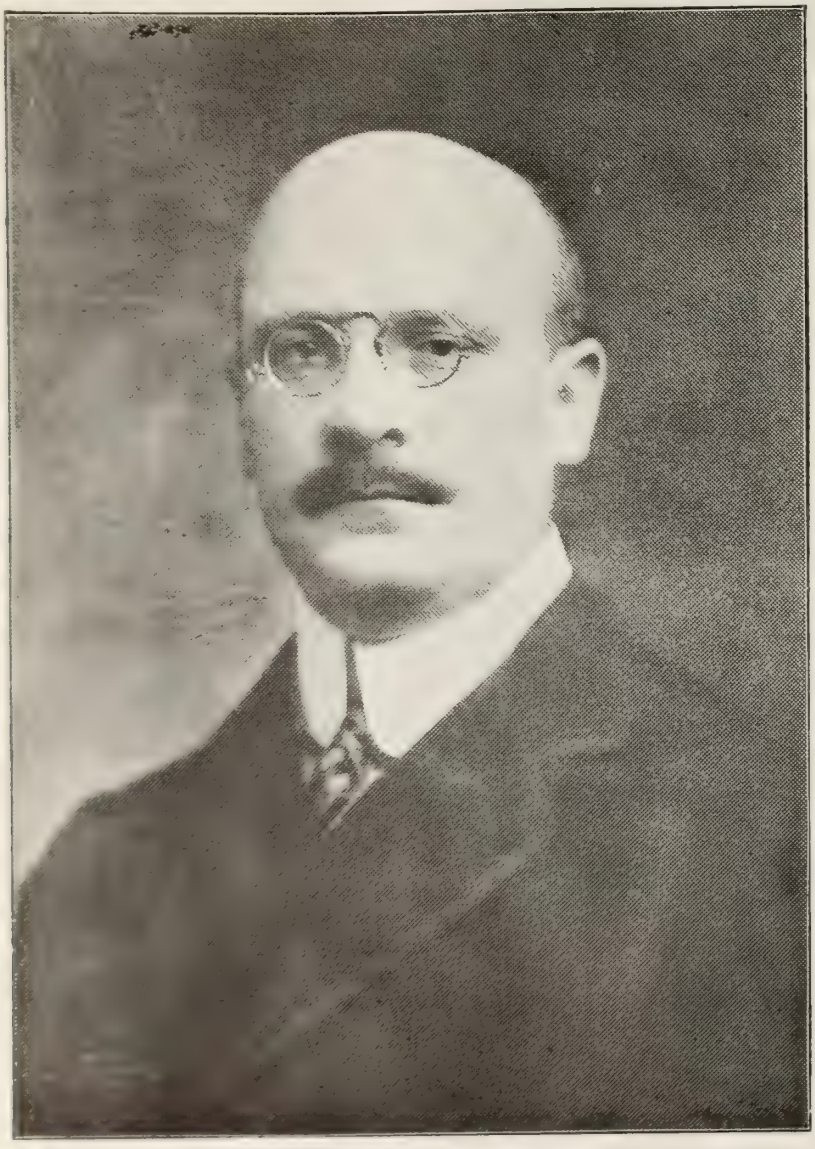
The dock which Messrs. Vickers, Limited, have built for their new shipbuilding establishment at Montreal is capable of taking the largest existing ship in the British Navy or the heaviest ship trading to Canada. The building of such a dock has been preferred to the construction of a masonry or concrete graving dock, because, although normally it will be utilized within the basin of the new extensive and well-equipped shipbuilding works of the firm at Montreal, it can be towed to any point on the Atlantic freeboard of the Dominion, to assist in the raising of ships which may get damaged by running ashore, and, in view of the hazards to which the Royal Naval and merchant ships are exposed, this will be of considerable advantage.

A feature of the design has been economy of dock operation; thus, although it is capable of taking the heaviest ships afloat, it will more frequently be used for vessels of quite moderate size, and on such occasions it will be unnecessary to utilize the full dock capacity or to run the machinery at full power.

In structural detail, everything has been done to make the dock continuously reliable, and in this connection, one feature alone need be mentioned. Steam-heating is provided to prevent water in the compartments from freezing and to preclude the mechanism from becoming affected by frost. This is most important, because the dock may have to be sunk under a ship in the most severe winter weather, and it is important that the water in the compartments, ensuring this sinking, can be pumped out when required.



C. C. BALLANTYNE
Member, Montreal Harbor Commission.



GEORGE WASHINGTON STEPHENS
Chairman, Montreal Harbor Commission.

All the machinery is in duplicate, and the equipment includes every conceivable appliance to facilitate the docking of a ship. The length of the dock is 600 feet, the width over all 136 feet, the depth of the pontoons at the bottom 17 feet, while the side walls rise to a height of 42 feet from the pontoon deck, so that the overall depth is 59 feet. There are bridges at both ends for the conveyance of workers.

Vickers Works at Montreal.

It may be added that the Canadian Shipbuilding and Engineering Works of the Vickers Company are situated at Maisonneuve, Montreal. They cover an area of over 30 acres, and include a basin of about 12 acres, having a quay frontage of 2,500 feet. When fully in operation, they will employ over 2,000 men. The site is admirably situated. The land has been in a great measure reclaimed from the bed of the St. Lawrence, which, at this portion, is over one mile in width, and dredging has considerably increased the depth of the river channel where it passes the works. Excellent railway facilities have been afforded by the Montreal Harbor Commissioners.

The constructional details of the buildings are such as to suit Canadian climatic conditions, and were only decided on after the Canadian Vickers Company had sent their representatives to study the question, in association with the Montreal architects and contractors. Generally the buildings will be construc-

ted of steel framing. The sides instead of being covered with corrugated sheeting, as is the usual practice in British yards, will be formed of brick, which, besides being warmer during the winter, should be cooler during summer. The building berths are to be so arranged that vessels up to 1,000 feet in length can be built. In the meantime, a covered berth has been erected, so that the work may not be stopped during the winter months.

The directors of Canadian Vickers Limited are:—Albert Vickers (chairman), Sir A. Trevor Dawson, Sir Vincent Caillard, Mr. F. Orr Lewis (president Canadian Board), Sir H. Montague Allan, Mr. Preble MacIntosh, and Mr. James C. Lewis.

Cake and Wine Banquet.

After the ceremony at the dock, the Minister of Marine and the general company of guests made a long tour of inspection of the most important departments of the Vickers' works, under the guidance of the directors of the company, and at noon they gathered together at the offices and partook of cake and wine.

Sir Trevor Dawson.

Sir Trevor Dawson presided, and in the course of his speech said: "It is my great pleaure, on behalf of the chairman and of the Vickers company, to propose the health of Mrs. Hazen, who has been so good as to come to Barrow to christen the great dock, which we have seen this morning. We are also much honored by the presence of Mr. Hazen, the Minister of Marine and Fisheries of Canada, and also of Mr. Doherty, the Minister of Justice, and of so many distinguished Canadians. We hope that what you have seen in the works has interested you. In the near future we intend to have in Canada an organization approximating generally to that existing here, for the building and equipping of vessels of all types. The dock will leave Barrow about the 10th of August, and should arrive at Montreal in September, approximately at the date given in the contract, notwithstanding the coal strike, which made it difficult to carry on work satisfactorily. We realized, however, the importance of meeting the views of the Dominion, as the dock is so essential to the prosperity and usefulness of the Port of Montreal, improving as it will, the facilities for repairs and overhauling ships.



L. E. GEOFFRION
Member, Montreal Harbor Commission



HON. C. J. DOHERTY
Dominion Minister of Justice.

Montreal a Great Shipbuilding Centre.

I would like, in a few words, to refer to the undertaking we are building up in Montreal. The Vickers Company are devoting much capital, I might almost say in association with the Canadian Government through the Harbor Commission of Montreal, in order to help the Dominion in developing her industrial resources. We hope to make Montreal a great shipbuilding centre. At the present moment we are, or rather the Harbor Commission are, recovering from the bed of the St. Lawrence some 30 acres of land, and we are constructing a large basin for the accommodation of the floating ship dock, and as soon as the dock arrives, the basin will be available and the dock ready for the services for which it is intended. The necessary ship repairing plant will be completed so that ships may be repaired satisfactorily; at the same time there will be available a great shipbuilding

establishment, so that one of the ambitions of Canadians will be realized.

We would like the Government of Canada, and the people of Canada to know that we are going into this great undertaking and spending our money to equip it thoroughly as a first-class shipbuilding establishment, so that we can build ships from to-day in Canada, if only the Dominion Government will indicate to us the type of ship that is wanted. It is our urgent endeavor to meet in every conceivable way the wishes of the Government, and we hope we shall receive support from them, as we believe we shall. We have to thank the Harbor Commissioners for all they have done in connection with this enterprise. We have present to-day Mr. C. C. Ballantyne, and needless to say we are very pleased to see him, and to thank him for coming. Concluding, Sir Trevor gave the toast of the "Health of Mr. and Mrs. Hazen and the Prosperity of the Dominion."

The Hon. J. D. Hazen.

The Hon. J. D. Hazen, Minister of Marine, in responding, said: I do not want you to imagine, because I am rising up to respond to this toast instead of my wife, that she is not quite capable of doing so. I have the very best reassons for knowing that she is very well able to express herself on some occasions, even with a considerable amount of directness and force, but it is only from modesty that she has asked me to reply. I would like to take the opportunity of extending my very hearty congratulations to yourself and Sir Vincent Caillard and the other directors of Vickers Limited on the very successful completion of the dry dock which has been built by arrangement with the Government of Canada and the Harbor Commissioners of the city of Montreal. I sincerely hope that the dock will reach its place in the basin which has been prepared for it, in Montreal, with safety, as we have every reason to believe that it will. It will be a most valuable equipment for the Port of Montreal.

The St. Lawrence is deficient in the matter of docks, as are many Canadian ports, consequently ships trading to the St. Lawrence, if they required to dock would have to go a thousand miles for accommodation. The dock, which has been named to-day, is, I understand, the second largest of its kind to be built in the United Kingdom. It will be a tremendously important addition to the equipment of Montreal, and will provide facilities for repairing and docking vessels which is much needed there. It will prove also in time to be a source of very considerable income to the very enterprising company who have constructed it, and whose guests we are today.

I understand that the dock has a capacity of 25,000 to 30,000 tons, which is in excess of any vessel coming to the St. Lawrence at the present time. When, however, we recollect that the channel from Montreal to the sea was only 10 feet deep, when we recollect that it is now 30 feet deep, and that the Government of Canada is proceeding this year with the work of still further deepening that channel, I think we may expect that in a not far distant future, vessels will come to the Port of Montreal which in size and tonnage will perhaps tax the capacity even of the great dock.

We are living in an age when things move quickly, where there is great improvement and very great advances, and there are people in Canada who look forward to the time when Montreal will not be the furthest point on the St. Lawrence for deep sea navigation. That may perhaps be a little visionary, but it is no more visionary than were the ideals of the men who had a good many years ago thought of a railway running from the Atlantic to the Pacific ocean.

Transportation Problems.

One of the great problems which has to be faced is the problem of transportation the problem of getting the great products that come from our Western Provinces down to the ports of the Great Lakes. The question is becoming very serious with us, being one of more railway facilities. It is for this reason that the Government of Canada has undertaken the Hudson Bay Railway, so that part of the traffic could be dealt with through the Hudson Bay.

Hand in hand with the question of transportation, there is the question of harbor improvements, and I may say it is the intention of the Government of Canada to spend sufficient money to equip the ports of Canada, the St. Lawr-



REAR-ADMIRAL C. E. KINGSMILL
Commanding the Marine Service of Canada.

ence, Pacific, Atlantic, and Great Lakes, so that when the traffic reaches these, it can be handled in a way that is in harmony with modern ideas .

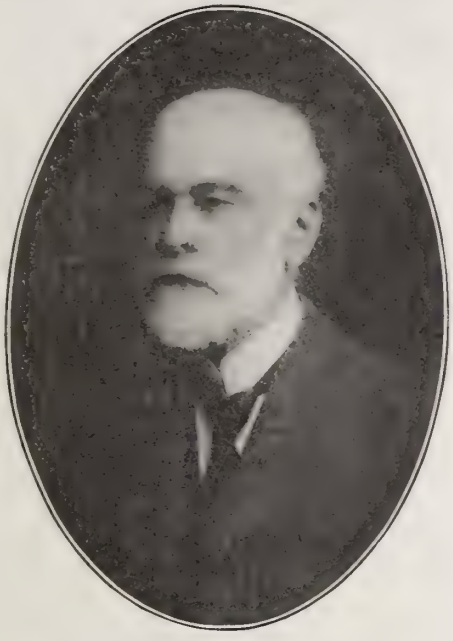
It is delightful to hear that the Vickers Company propose to establish in Canada a great national industry and a great national undertaking, which, if set about by the men who have made such a tremendous success of the Vickers Company in England, evidence of which success and enterprise we have had an opportunity of seeing to-day, I say, if the company set about in Canada to make this a great national enterprise and a great national undertaking from our Canadian standpoint, and from the standpoint of the Empire, they cannot fail in doing so, because I am sure in their vocabulary there is no such word as "fail."

Canadian Shipbuilding Outlook.

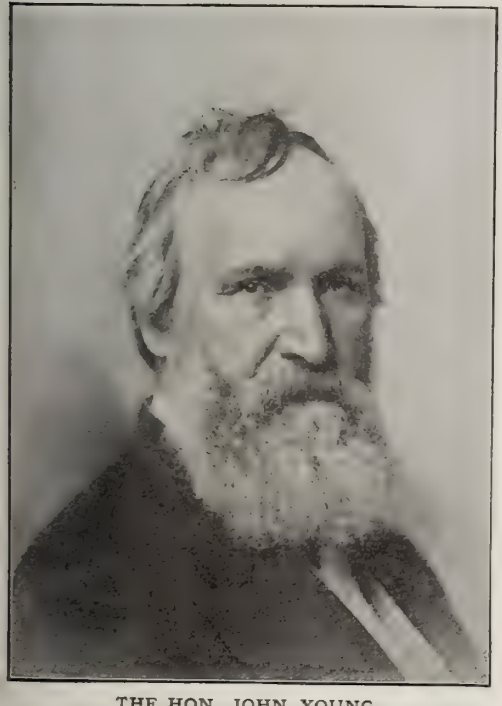
I am sure that the people of Canada will be delighted, and will be disposed to encourage such an industry in their midst, and I sincerely hope that the fondest anticipation which you have at the present moment of the development of the Canadian business may be more than realized, and that we may see in Canada a great enterprise giving employment to thousands of people, as it is doing in the community in which we are to-day. I believe that the Vickers Company will be pioneers in the enterprise, and in the future we will see shipyards not only in Montreal, but in all ports of Canada.

Canada's Governor-General.

I would like to say that it is a pleasure to Canadians to know that the Montreal dry dock has been named after the Governor-General of Canada, and that his Royal Highness, the Duke of Connaught, has been graciously pleased to permit his name to be used in that connection. I take the liberty of saying here that the Duke of Connaught has filled the position of Governor-General in a way which has met with the universal accord of the people of Canada. As Governor-General, he has taken a profound interest in all matters that are dear to the hearts of Canadians; he has been found easy of access on all occasions; a man of wise understanding and good judgment, and his popularity is unbounded. Canadians will be delighted to see this dock bear the name of one who will leave behind him when he departs from Canada memories which will endure.



JOHN KENNEDY, C.E.
Consulting Engineer, Montreal Harbor Commission.



THE HON. JOHN YOUNG
A pioneer of transportation in Canada.

Montreal Harbor.

I would like just to say one word more about Montreal. The Federal Perliament is disposed ungrudgingly to provide money that is necessary for the purpose of developing that port and that harbor. The reason is that it will be almost impossible for some years to come to keep pace with the rapidly growing interior of the country. The Harbor Commissioners, when they took charge, adopted a plan which they endeavored to live up to. They got the advice of engineers in Europe, in ports that have world-wide trade; they had these reports carefully examined, and then they prepared a plan for the developing of the harbor, which was approved of by the Government of the day. The Government of the present day are prepared to advance to the Harbor Commissioners at Montreal such sums as may be necessary in order to keep pace with the increasing trade and the increasing commerce of the country.

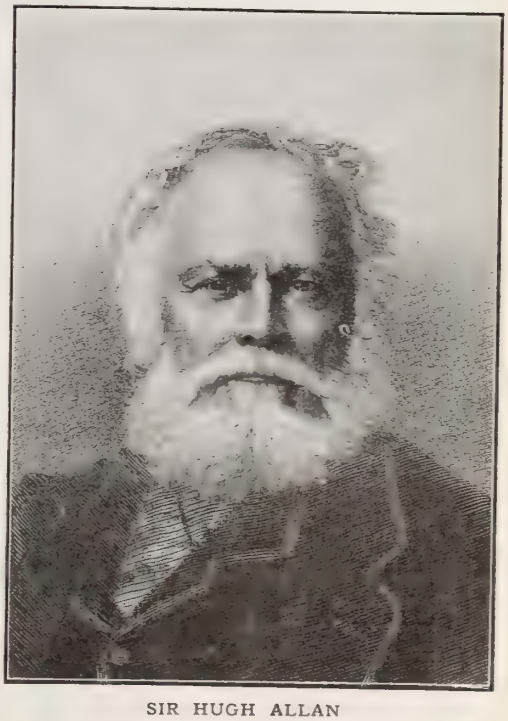
Concluding, Mr. Hazen said that the visitors had had a revelation of the organization with which a great industry of this kind is carried out, and he thanked the firm for their generous and splendid hospitality.

Sir Vincent Caillard.

Sir Vincent Caillard said: The pleasing and agreeable duty falls upon me of thanking Mr. Hazen very sincerely for the kind words which he has spoken about our firm. I was present not long ago at a great banquet to the Canadian Ministers by the Royal Institute at London, when Mr. Borden seemed to suggest that Canadians had no need to use the prayer, "May God give us a good conceit of ourselves," and I feel now as if I ought to express myself modestly, especially in view of the very kind praises which Mr. Hazen has showered upon our firm, but that feeling of modesty is overcome and masterel by the consciousness of a pride to which I and all my brother directors must confess in the firm whose affairs we have the honor to direct.

Capacity of Vickers Works.

I think it may interest you to hear something as to the capacity of the works, which is always increasing. In the past five years we have had in the works five Dreadnought battleships, three protected cruisers, three armoured monitors, 39 destroyers and submarines, one armed transport, as well as some vessels for which we have been favored with orders from Canada—two ice breakers and this great dry dock for Montreal. In addition to this we have



SIR HUGH ALLAN
Founder of The Allan Line Steamship Co.

built four floating docks, several high-speed merchant vessels, survey ships, various tugs and passenger boats, beside machinery for battleships and gunboats. The annual tonnage built at Barrow for these last five years has averaged 50,000, all ships of the most important class, and machinery of a horse power of 115,000. That is a record of which, I think you will agree with me we have every reason to be proud.

Canada's Part in Empire Defence.

Mr. Hazen in his interesting speech said that there was a great problem facing the Canadian nation which is present in all our minds, and we fully appreciate it is very difficult for the Canadian Ministers at present with us to touch upon under existing circumstances. It is the problem of what share the Dominion of Canada is going to take in the future in the defence of Britain in maintaining British sea supremacy. The thought which is always in my mind—if I may express myself for one moment on politics—is the critical period through which the British Empire is now passing, and the importance of a great overseas Dominion like Canada acting on the impulse of that abounding patriotism which we all know actuates her people, to come forward without waiting, and show to the world what the sons of England over the seas are willing to do to maintain the Empire of which they are all so proud.

We are not only proud of ourselves as a great industrial firm, but I think we may say we are proud of ourselves as an Imperial asset. The Vickers firm is Imperialist to the core, and we are most happy to think that if the Canadian Government wishes now to come forward and assist the people of these islands in carrying the tremendous load which is bearing on their shoulders, we are ready to help them to carry out every wish that they may have in the way of helping to bear that burden. I hope you, Mr. Hazen, and your Government, will rest assured that you have only to express the wish for us to come forward and create for you a national arsenal and we are ready.

Sir Trevor Dawson.

Sir Trevor Dawson: We have present to-day a most distinguished Canadian Judge Doherty, the Minister of Justice of Canada, who represents one of the important divisions of the city of Montreal. It is very fortunate that he has been able to come, and we would like to drink to the success of the great city of Montreal, with which we hope one day to be more intimately connected. I would like to couple with this toast the names of Judge Doherty and Mr. Ballantyne, who is one of the Harbor Commissioners of Montreal.

Judge Doherty.

Judge Doherty, Minister of Justice, in replying, said: My friends know me as a frequent and lengthy speaker, but they will learn with glad surprise that I am in a silent mood this morning. We have spent our forenoon face to face with "immensity;" immensity of the great works that are carried on in this great establishment; immensity in the mechanical ingenuity that produces these works; immensity in the resources that are behind these works; and perhaps, most of all, immensity in the inventive genius that has discovered how to utilize that mechanical capacity and those immense resources to produce the marvelous results that are seen in the ships that are turned out from this establishment. I think there is no impression, no result that comes over one from the impression of immensity which is more direct than the disposition to silence. One feels so fully incapable of saying anything that would adequately express one's marvel, that silence seems to be the natural resort.

The chairman has been good enough to propose prosperity to the city of Montreal. I am proud to be a native of the city of Montreal, to have passed my life among its citizens, and I am proudest of all that they have honored me in making me a representative of one of its greatest divisions. I wish to thank you, Mr. Chairman, for the drinking of that toast. I wish more especially to express to you and to this great company, the high appreciation of the citizens of Montreal of the fact that when you came over to Canada, seeking to establish your great institution in the very heart of Canada, you chose, you recognized as a great heart of that great country, the great city of Montreal.

We are glad to follow Mr. Hazen when he foreshadows further development that may carry the great ocean navigation of the world further into the interior of our country, but for all that, we Montreallers are proud to speak of Montreal as the heart of our great country, and we are glad to think that our judgment was confirmed in that respect by such competent gentlemen as the Vickers Company. To that heart of that country your coming is most welcome. We appreciate what a great work you will be doing, and are doing, for the city of Montreal by providing for the establishment of an industry that we hope some day to see rivalling the one that we have witnessed in operation here to-day.

A National Benefit.

What you are doing in that respect is not for Montreal alone, but for Canada as a whole, and we welcome you because of the great good your coming among us will be in aiding us to advance the prosperity of that country. We welcome you in establishing this great industry, because such action on your part is of a nature to produce results greater and more valuable than the mere material results of providing employment for the people that may be there, and helping us to build an industry that may conduce to the greater prosperity of our people. Your coming over is a lesson and an example that we trust may be followed, and I am quite sure there is no means by which more could be done to hold together the different nations of the different races making up those nations, than the action of men like yourselves, living here at the very heart of that Empire.

Sir Vincent Caillard has referred to what the overseas Dominions might do. This is not the moment when it is open to any man occupying any position in the Government of Canada to discuss the matter publicly, but I may say that there is no lack in Canada of a disposition to meet generously and willingly any duty and any responsibility that may be fairly considered to be incumbent upon her, with regard to the defence of this great Empire. I repeat it, that there is nothing that would more tend to enhance and keep alive that sentiment, and perhaps encourage it to more prompt actual results than the action of this company which we trust may be followed by the success which you desire.

Mr. C. C. Ballantyne.

Mr. Ballantyne said: I thank you on behalf of the Harbor Commissioners for associating my name with this important event. My first pleasure and duty is, on behalf of the Harbor Commissioners of Montreal, to thank Mrs. Hazen for coming down to Barrow from London and christening the huge floating dry dock that you saw this morning, and has been referred to eloquently by Mr. Hazen. We are particularly pleased that this large ship has been called after the Royal Canadian Governor-General.

I wish to say that I thoroughly agree with all that Mr. Hazen has said about the nationalizing of the ports of Canada. It is gratifying to know, now, that in the port of Montreal we will be able to take care of any vessels that may become disabled. There are twenty vessels working the St. Lawrence, the nearest dry dock for the accommodation of which is Halifax, 1,000 miles away. You can readily recognize, therefore, how badly a dock is needed.

TITANIC ENGINEERS' MEMORIAL.

AT a public meeting held recently in the Council Chamber of the Liverpool Town Hall, over which Lord Derby, in his capacity as president of the Titanic Engine Room Heroes Memorial and Lord Mayor of Liverpool, presided, Mr. A. G. Maginnis, speaking in support of the resolution to perpetuate, by a suitable memorial, the record of bravery and devotion to duty of the ill-fated ships engineering staff, said, "It only remains for me to put forward a brief outline of the progress of the movement.

When the first news of the loss of the vessel became known, its magnitude on all sides, in the tremendous loss of life, in the size of the vessel, and in its far-reaching effects, caused everywhere widespread regret and sympathy for all concerned. Then, as the news came of the gallant way in which the unfortunate commander and crew generally carried out their last duties, public admiration was loud in their praise. Later, as the fuller details became known, and it was proclaimed that the pumps were kept at work throwing out vast volumes of water right up to the end, and that the vital sources of the wireless communications and the even more important fact of spreading light upon the scene to enable the lifeboats to be loaded up and despatched, attention was drawn to the engine-room staff below. Suddenly called to their posts, the whole staff of 30 or more men (without the slightest regard for their own safety) proceeded to the lowest parts of the vessel where their duty lay, and then surrounded by every peril which it is possible to conceive, directed by one of the most able and trained chief engineers of the merchant service, they put forth every exertion to save their ship, and so well was this duty carried out that not one of the trained staff survived.

As it was considered that this devotion to duty represented a brave deed worthy to rank with any hitherto recorded in naval or military annals, or the more modern and none the less perilous deeds in the mining world, it was felt that in some way a permanent record of the event should be made, hence the present movement. Thanks to the Lord Mayor's sympathy and valued assistance, the movement was started, and considerable progress has been made, a sum of over $10,000 having been reached, but as many subscribers are scattered over the globe, it will be some months yet before the subscription lists can be closed. With the amount collected it is proposed to erect a handsome visible memorial, it being evident that all requirements in the way of providing for the dependents and relatives of these lost and for the wants of the survivors are amply assured by the fact that over $2,000,000 has been collected for that purpose.

Not without some justification, we, of the engine-room staff, who are generally hidden from sight, oftentimes feel that we are overlooked, and but little share of the praise so freely bestowed upon the thrilling deeds of the sea is given our way, as for instance in the case of the Carpathia when going to the rescue. Had it not been for the superhuman efforts of the trained staff below, seconded by the plucky firemen and trimmers, that vessel's speed could not have been increased from 14 to 17½ knots, when rushing to the rescue.

Whilst giving full praise to the gallant but unfortunate commander, and also to the lost and surviving officers and other members of the crew, not forgetting Mr. Thomas Andrews, one of the builders' staff, it is proposed that the memorial be confined to the commemoration of the 32 brave men of the engine-room trained staff, who, knowing the danger, rather than desert their posts, perished."

Mr. G. E. Martindale said that they were very greatly indebted to engineers for the great bravery and skill they showed at sea, and he agreed with Mr. Maginnis that the engineer was too often neglected. He thought they wanted something to touch their hearts as they went along and nerve them up to deeds of bravery, and when engineers saw that memorial and knew the deed of bravery it represented it would nerve them to uphold the honor of England in like fashion should occasion arise.

CANADIAN GOVERNMENT NAVAL REGULATIONS.

THE Canadian Government may not have made up its mind as to its naval policy, but it has taken a new departure in announcing: "That, having taken into consideration the fact that local or other circumstances may arise in which it may be necessary on account of periodical exercises, manoeuvres or otherwise, to forbid all entrance to certain ports of the Dominion, this is to give notice that on approaching the shores of Canada or the ports of Halifax, Quebec, and Esquimalt, a sharp look-out should be kept for the signals specified. In event of such signals being displayed, the port or locality should be approached with great caution, as it may be apprehended that obstructions may exist."

British Admiralty Plans Adopted.

The regulations follow those of the British Admiralty, and are of the most stringent character. For instance, if entrance to a port is prohibited, three red vertical lights by night or three red vertical balls by day will be displayed. It is also provided that special care must be taken by mariners in entering the three ports mentioned when searchlights are working.

Disobey at Own Risk.

Provision is also made by which special ships will be appointed to examine vessels desirous of entering the ports mentioned and "As the institution of the examination service at any port will never be publicly advertised, special care should be taken in approaching the ports by day or night to keep a sharp look-out of rany vessel carrying the distinguishing marks and to be ready to bring to at once when hailed by her, or warned by the firing of a gun or sound of a rocket."

Masters are warned that they must give due attention to those regulations at their own risk, and strictly obey all instructions given them by the examining steamer.

PREVENTING COLLISIONS AT SEA.

SIR HIRAM MAXIM has issued an extremely interesting pamphlet on "A New System for Preventing Collisions at Sea." Sir Hiram contends that, whereas all warm-blooded animals, including Man, have five senses, one animal—the bat—has a sixth sense, which enables it, as proved a century ago by the Abbe Spallanzani, to follow insects and seize them without seeing them. When a bat flies about in total darkness, the beat of its wings sends out a series of pulsations or waves, after the manner of sound-waves, but of too low frequency to be considered as sound. These waves strike against all surrounding objects, and, like light or sound, are reflected back to their source of origin. This is the mechanism of the bat's sixth sense. Construct an apparatus that will produce atmospheric vibrations of about the same frequency as those of the bat, but using two or three hundred horsepower of energy, and we shall get vibrations able to travel from the ship at least five miles, and send back to it a reflected echo strong enough to be detected. Such an apparatus Sir Hiram Maxim has constructed and is willing to show the complete working drawings to all interested.

London.—In the House of Commons on July 2, the Colonial Secretary, Mr. Lewis Harcourt, announced the list of present contributions to the British Navy as follows:—New Zealand, $500,000 and a battleship, value $10,000,000; South Africa $425,000.



MOTOR YACHT "IMPALA."

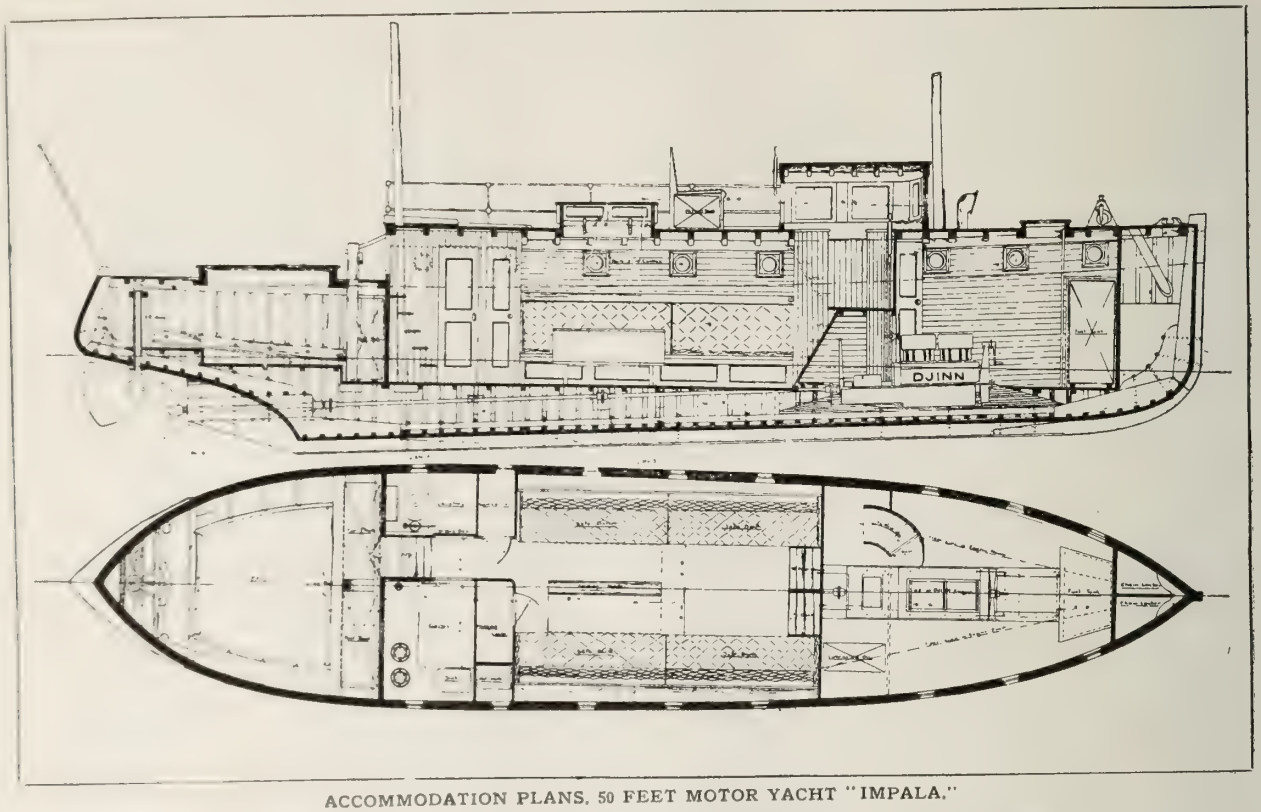
THERE is here described the motor yacht Impala, designed and built for hunting purposes in British Columbia waters. The propelling machinery consists of a 4-cylinder Djinn motor, constructed and installed by Brazil, Shaker & Co., Vulcan Ironworks, Bristol, England.

Accommodation Features.

Designed for use in both fair and rough weather, the yacht has several interesting features. Forecastle and bridge decks are in one, and a sunk pilot house having full engine control is provided; one man is, therefore, easily able to operate the vessel from this station. Embarking amidships, one descends by a companionway to the pilot house, from which a stairway leads forward to the engine room and another to the main saloon. This latter compartment is particularly large, measuring some 14 ft. in length, with a width of 10 ft., and nearly 7 ft. headroom. A large skylight is fitted, giving still greater headroom over a considerable portion of the floor space. When the yacht is being used by a hunting party, eight berths can be made up in the saloon, while a heavy curtain is provided by which it may be divided into two compartments when required. Green-figured tapestry and upholstery are provided, and the woodwork is of stained fir, finished bright.

Aft of the saloon on the port side, there is a locker for guns and fishing tackle, while to starboard a large wardrobe is fitted, which contains a hot-water tank for drying cloths, etc. Aft of the gun locker is a small lavatory compartment; hot and cold water being supplied by gravity. Across the passage is a very roomy galley, having full size kitchen range, sink with hot and cold water, wood and coal lockers, plate shelves, etc., and a large square window giving ample ventilation.

The vessel is heated throughout with hot water, being thus rendered comfortable even for winter cruising, duck-shooting, etc. On the after deck, where there is not sufficient headroom for comfort, the space has been utilized as a hold in which the owner can carry tents, stores, a few extra drums of petrol, or other fuel, etc.



ACCOMMODATION PLANS, 50 FEET MOTOR YACHT "IMPALA."

Machinery Equipment.

Turning to the machinery installation, the engine is of the Djinn standard four-cycle type, having four cylinders, each 5½ in. bore, 7 in. stroke, and developing 40 b.h.p. at a speed of 600 r.p.m. In general design, it follows partly the firm's practice for their ordinary yacht type of engine, and partly that of some heavy duty engines. A three-bladed, 30 in. diameter propeller is fitted. The cylinders are cast in pairs and fitted with large jacket cleaning doors, all valves being on the starboard side, mechanically operated, and with the down take type of valve port which is a characteristic feature of the Djinn engine.

The cylinders are supported on steel columns bolted through the engine bed,

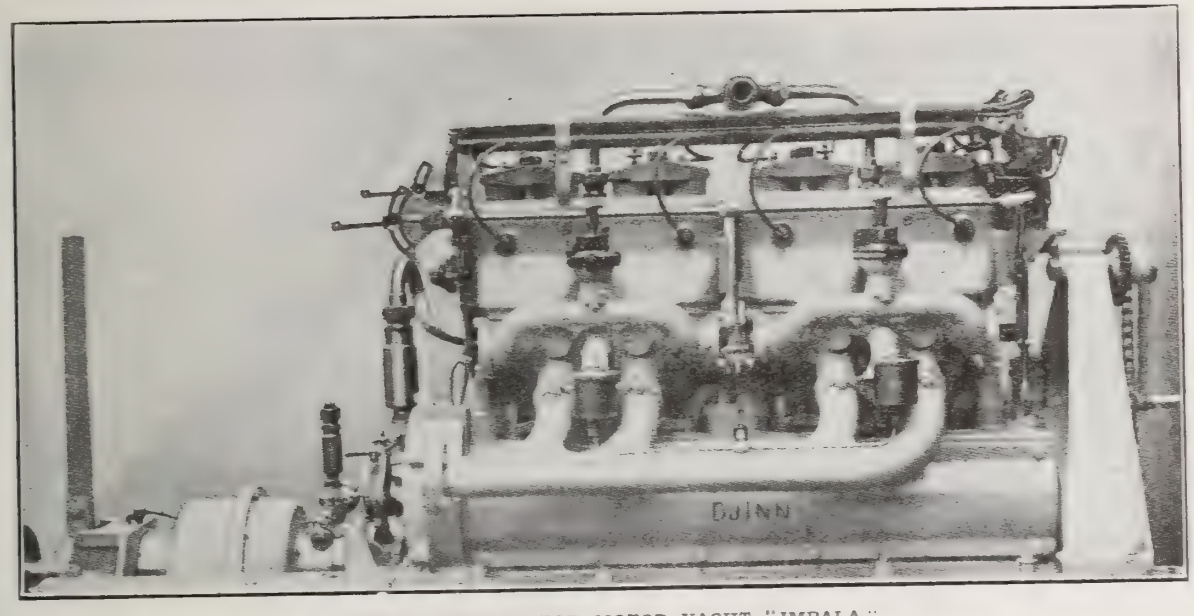
the crankcase being simply a light oil-tight casing. At the after end of the cylinders a steel control board is mounted, carrying the ignition and throttle-control switches, also sight drip feeds for the piston and reverse gear lubrication. There are three control stations, the engine room, pilot house, and deck, the connecting links being attached to the holes in the end of the control levers.

Engine Details.

Referring to details of the engine, a single shaft at the forward end drives the magneto and Lacoste distributor, the magneto being enclosed in a watertight cover, and the column carrying the starting handle completely enclosing the flywheel and preventing bilge water being thrown up. As regards accessibility, the camshaft removes sideways on the starboard side, the port side doors permitting the removal of connecting rods and pistons, all heavy duty practice. The same may be said of the valves, valve tappets, etc. The reversing gear is of the usual Djinn type, with the lever carried up through the floor of the pilot house, and placed in a handy position close to the wheel.

Pump Details.

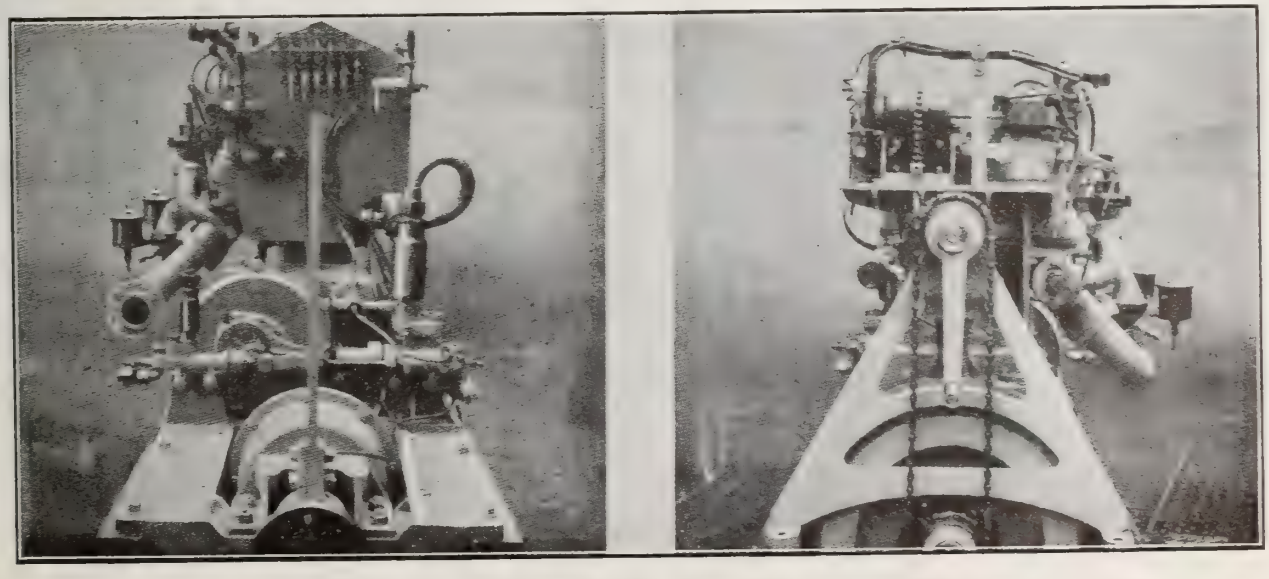
As regards the pumps, the illustration showing the after end of the engine shows another instance of Djinn practice in grouping accessories. Four bronze pumps, all of the plunger type, are fitted, these being used respectively for fuel, forced lubrication and cooling water, while the fourth is a bilge pump of similar construction. Of these pumps, the first three are mounted upon a plain bracket on the port side and the fourth opposite on the starbaord side. An extension of the camshaft through the end of the cover over the half-time wheels carries a single balanced eccentric whose eccentric rod is coupled up to the crosshead of the cooling water pump, all three port side pumps being driven therefrom. Further a plain link is carried across to the bilge pump crosshead on the starboard side, passing in front of the eccentric rod, and the single eccentric drives the four pumps. The bilge pump link is made to uncouple in case it is not required to work continuously. The arrangement is simple and very compact, the pump sections coming only just off the edges of the bed-plate.



"DJINN" ENGINE FOR MOTOR YACHT "IMPALA."

Miscellaneous Data.

The system also means a saving in longitudinal space, as little end room is needed, the pumps being close to the crankcase. A cast-iron pipe distributes the cooling water, which discharges



END VIEWS OF "DJINN" ENGINE FOR MOTOR YACHT "IMPALA."

through a common pipe connected up to each cylinder. The engine is designed to run on kerosene, and the fuel consumption at full load is 3⅛ gallons per hour (0.6 pints per b.h.p. per hour). Lubricating oil works out at 0.32 pints per hour, or .088 pints per b.h.p. per hour. At the inlet, the cooling water has a temperature of 70 degs. F., while at the outlet the temperature has been raised to 120 degs. F. We are indebted to the "Motor Boat" for the illustrations and general particulars.

PACIFIC COAST LETTER.

By George Bulkeley, A.M.I. Mech. E.

IT may be stated, with a very fair amount of accuracy, that power yacht designing presents the greatest difficulties and worries to that long-suffering and often unappreciated enthusiast, the naval architect, who has to combine in one profession the qualifications of the artist, engineer, scientist, furniture dealer and upholsterer.

The sailing yachtsman is almost always after speed and "weatherliness," and, be his proposed new yacht ever so large, will generally sacrifice some "shore comfort" to gain the most efficient design possible. On the other hand, power boat yachtsmen not infrequently regard "shore comfort" aboard their vessels as the sine qua non; with the result, that the naval architect entrusted with the designing is often confronted with the problem of a vessel, the overall length of which is restricted by the amount expected to be spent on her first cost, but in which living, sleeping, cooking and washing accommodation for a fair sized family have got to be arranged on a more or less luxurious scale,—and this without making the hull of "breadth equal to length."

Naval Architect's Ideals.

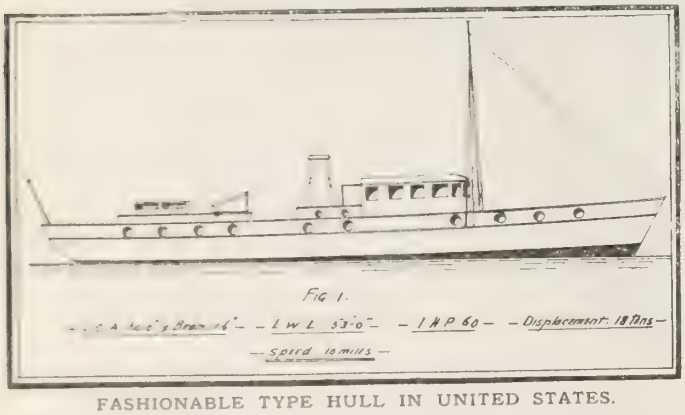
All trades have their ideal, and that of the naval architect is commonly understood to be a vessel of fixed beam, but of waterline length equal to infinity. Although it may be possible only to dimly approach this ideal even in the best designed craft, still there are certain fundamental points on which the expert should not give way to the owner. One of these fundamentals is waterline length. It is strange how this most important dimension is neglected in yacht design. In torpedo boat destroyers and fast turbine passenger vessels, every six inches of waterline length obtainable is taken advantage of, while with yachts (which are presumably required to pass through the water with the minimum of fuss, and to make the maximum speed possible with the horse-power obtainable), it is chopped away fore and aft in all sorts of shapes.

One of the worst examples of chopping the waterline length is found in what has somehow come to be a very fashionable type of hull in United States waters, and which has unfortunately migrated to Canada to some extent. This is shown in figure 1. The overhanging bow and stern in this type must evidently be a relic of the early days of power yachting when enterprising men installed, (amid the jeers of their fellow yachtsmen) the uncouth marine gasoline engines of the early nineties in such second-hand sailing craft hulls as could be obtained. In the case of a sailing craft, the bow and stern overhang has a raison d'etre in the fact that a foot hold is required aft to handle sail which is bent to an overhanging boom; that a plumb stem would often entail a bowsprit of unwieldy length; and also that, while waterline length is penalized in handicapping formula, the vessel is doing her best speed when heeling over, by which she gains extra waterline length from her overhang, and consequently more speed. With a power yacht, however, her best speed is presumably done on an even keel, and any overhang fore or aft cuts down her waterline length and spoils her speed and seagoing qualities, besides taking away from interior stowage space and generally preventing the hull from being of best design for the given overall length. Further, it causes the yacht to have an appearance not in keeping with the recognized "forms of the sea."

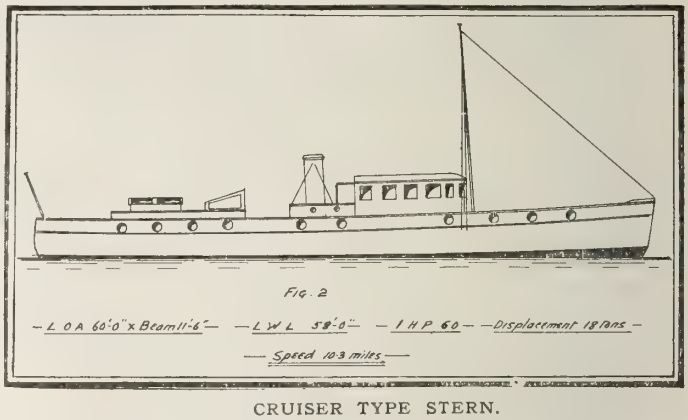
In order to show the quite considerable difference which apparently small variations in waterline length will make to the speed of the yacht, figures 1 and 2 are given. Both of these represent a power yacht of 60 ft. overall length by 11 ft. 6 in. beam. Midship area, molded depth, draft, displacement and indicat-



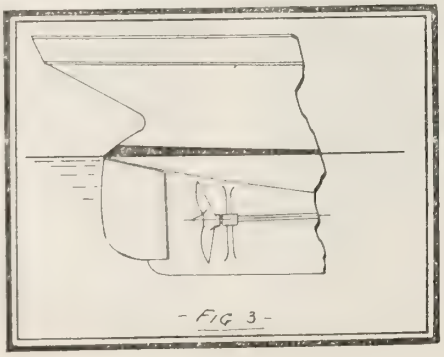
H.M.C.G.S. "RAINBOW" IN ESQUIMALT HARBOR, B.C.



FASHIONABLE TYPE HULL IN UNITED STATES.



CRUISER TYPE STERN.



UNDERHUNG RUDDER TYPE STERN.

ed horse power are the same in each case, the only difference being, that in fig. 1 the yacht has a waterline length of 53 ft. (due to the cut-away bow and stern), while in fig. 2 the vessel has 58 ft. waterline length and a cruiser stern.

Figuring by Linton Hope's well-known speed formula, (which has proved remarkably accurate in practice) we get:—

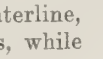
$$S = \sqrt[3]{\frac{H.P. \times L \times \sqrt[4]{MA}}{D}} \times C$$

Where S = Speed, in knots (multiply by 1.15 for miles).
L = Length of load waterline.
HP = Indicated horse power.
MA = Midship area.
C=Constant (1.77 for this type of vessel).
D = Displacement (Long tons).

The vessel with the 53 ft. waterline, fig. 1 shows a speed of 10 miles, while that with the 58 ft. waterline will travel at a speed of 10.3 miles; quite a considerable gain.

In order to take advantage of the maximum waterline length possible in a vessel of given length overall, it is necessary to either have a cruiser stern as shown in fig. 2, or a stern of the built-in underhung rudder type, fig. 3. The latter stern is an expensive one to build, and its use is not warranted in any vessel smaller than 100 ft. overall length; while the cruiser stern is suitable for any sized power craft from 25 ft. overall length up. This type of stern is universally adopted in the navy, except for destroyers which usually have a flat run aft to minimize "squatting" at high speeds. It is being adopted for coastwise and ocean-going passenger steamships, of which we have already two examples on this Pacific coast, in the G.T.P. steamships "Prince Rupert" and "Prince George;" while the two new trans-Pacific C.P.R. "Empresses," are being built with cruiser sterns also.

The accompanying photo of H.M.C. G.S. "Rainbow," taken at Esquimalt Harbor, Vancouver Island, shows the type of stern as adopted on navy vessels.



A TRIBUTE TO LASCARS.

THE seeming incapacity of the crew of the ill-fated steamer Titanic to handle the lifeboats in a truly seaman-like manner when afloat with their human freight, and the outcry raised because of the disappearance of the British tar and his replacement by foreigners of doubtful intelligence and ability, has been given further prominence through the collision between the P. & O. Liner Oceana and the Re Pixagua in the English Channel, on which occasion some 17 lives were needlessly sacrificed. Remarks, more or less uncomplimentary, have been directed against the Lascar crew of the former vessel, therefore, the following reprint of a letter recently sent to the London Times will doubtless be read with interest, expressing, as it does, in no uncertain tones, the worth of these men aboardship, and justifying their employment by steamship owners:—"Having spent the whole of my life at sea before being appointed to my present position of Marine Superintendent of this port, I have read with interest many of the references in Parliament and the Press to the respective merits and demerits of English and Eastern sailors, with both of whom I have had considerable experience. Let me say at the start that I have had no experience of Chinese or other foreign Lascars, and that while I believe the Indian sailors to be preferable in the tropics, I do not for similar reasons consider that they should be asked to face the extreme cold of the North Atlantic.



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MEDICAL INSPECTION.

"Taking the white or dark British sailor, after many years' experience of both, I (with the above qualifications) absolutely prefer the British Lascar under all conditions of work or emergency. The English sailors' good and bad points are known to most, and among the latter must be recognized that in most cases they cannot swim, while a large proportion cannot go aloft or handle a boat—indeed, the English sailor on the steamer of to-day, is more of a laborer than a seaman.

"The British Lascar, on the other hand, is usually an expert swimmer, handy in a boat, and able to climb aloft and handle a tackle most deftly; indeed on my steamer I trusted them above anyone in the handling of heavy weights during discharge. As regards their attitude in emergency, I have personally never had my ship in collision or wrecked, but I have been attacked by fire, when the Lascars were cool and active to a degree, and had to be deterred rather than encouraged by their officers from taking personal risks.—J. Humphreys."

DOCKING AND REPAIRING VESSELS.

THE opening question considered at the first session of the Second Section of the International Congress of Navigation, presided over by Mr. Elmer L. Corthell, was "Means for Docking and Repairing Vessels," upon which eight papers were submitted. The first was the composite work of H. Monch, of Berlin; Ph. V. Klitzing, of Kiel; and P. Hedde, of Berlin; while the others were contributed by L. Descans, of Antwerp; James Donald, of Quincy, Mass.; A. Guiffart, of Lorient, Edward Bok, of Newcastle-on-Tyne; Edward Egan, of Budapest; Luizi Luiggi, of Rome; and C. Nobel, Dutch Indies.

Condensed General Conclusions.

These papers were condensed by Rear-Admiral Mordecai T. Endicott, retired, who summed up the conclusions as follows:—

There can be no doubt that the decision as to the type of dock to be used in any locality must be made after a careful consideration of the conditions existing there. There may be some feature in the situation which would preclude the establishment or use of one or other type. Again conditions may affect the cost to such an extent as to settle the matter upon this basis alone, but there is in the minds of most engineers and naval experts a definite opinion as to the value and desirability of the two types where practicable to establish them, and the writer is of the opinion that this is the decision, if any, to which the Congress should give expression.

The preponderance of opinion, in the reports reviewed, is in favor of the graving dock. A study of these serves to confirm the opinion formed after an observation and experience extending over a long term of years, that graving docks supply in the greatest degree the conditions of safety, convenience and economy for the docking and repairs of sea-going vessels. After considerable discussion, the conclusions of Rear-Admiral Endicott were endorsed by the session.

CAPTAIN ROSTRON AT THE TITANIC ENQUIRY.

THE final stage of the British inquiry into the loss of the Titanic was entered upon, when the principal witness, Captain Rostron, of the Cunard liner Carpathia, told a thrilling story of the rescue of the survivors. On entering the witness box, the captain was thanked by the Attorney-General, on behalf of the Government, for his conduct, and for the large number of lives he was instrumental in saving. This expression of gratitude to a brave man was received with a round of applause, and when Lord Mersey and Sir R. Finlay associated themselves with the congratulations there was a renewal of the cheering in Court.

Captain Rostron's Evidence.

Captain Rostron, who bowed in acknowledgement of the congratulations, then proceeded with his evidence. Going back to the night of the disaster, he said that at 12.33, ship's time, the Marconi operator ran into his cabin—he had gone to bed, but was not asleep—and told him he had received an urgent distress signal from the Titanic, that she had struck an iceberg and was sinking, and giving her position. He immediately ordered the ship to be turned round and steered for the position given. Ordinarily the speed of the Carpathia was about 14 knots, but on that night they worked up to 17½ knots. About twenty minutes to three he saw a green flare about 20 miles away. That was the White Star Company's night signal. He made the remark that the vessel was still afloat, although the last message he had received stated that the engine-room was filling, which made him feel it was "all up."

For some time after that he was changing his course to avoid bergs. Rockets and Company's signals were sent up from the Carpathia. At four o'clock, having concluded that he had reached the vicinity of the wreck, he stopped. The green light was again seen, but he found that it came not from the Titanic, but from one of her boats. He was going to pick it up on the port side, but at that moment an iceberg was reported right ahead, so he starboarded and picked up the boat on the starboard side. When daylight broke the berg was a quarter of a mile away.

The engines had been stopped about three minutes before the berg was sighted, and the ship was then making 13 to 15 knots. He could not say why the berg was not seen earlier. They had a double lookout, two men being at the stem head. He saw 20 of the Titanic's boats altogether—13 lifeboats containing people, and one which had been abandoned, two emergency boats, two collapsibles which had passengers, and another which had been capsized. Seven hundred and five survivors were taken on board and landed at New York. One passenger died two or three hours after being taken on the Carpathia, and there were three dead bodies in the boats.

A Huge Icefield.

Asked for his impression as to whether the boats were full or could have accommodated more persons, Captain Rostron said several boats could have accommodated many more persons, while he thought two or three were rather crowded. He did not see much wreckage; only very small stuff, such as a few deck chairs and pieces of cork and lifebelts. He saw only one body. Captain Rostron added that the boats were scattered over an area of four to five miles. The last one was near the wreckage, and was picked up about a quarter to eight in the morning. There were 25 bergs from 150 to 200 feet high in sight, and smaller bergs which were too numerous to count. About three miles from the Titanic's position was a huge icefield, extending from N.W. and S.E. as far as could be seen. The night had been beautifully clear. Never before had he seen ice on that track in April.

In reply to the Attorney-General, the witness said he thought that if the weather were clear he would be justified in going at full speed, unless he knew there was a lot of ice.

Captain Apfeld and Captain Trible, of the Red Star Line, were called as to the practice followed when ice was reported. They agreed that in clear weather no captain would reduce speed unless the ice was thick.

THE MEDWAY FLOATING DOCK.

THE 32,000 ton floating dock, which has been under construction during the past two years for the Admiralty by Messrs. Swan, Hunter, & Wigham-Richardson (Limited), has arrived in the Thames. Like the one for Portsmouth now being completed by Messrs. Cammell, Laird, & Co., of Birkenhead, it has been built from Messrs. Clark and Standfield's designs, and its estimated cost is

$1,335,000. It is of the "box" type, that is to say, its side walls cannot be detached from the pontoon nor can the dock be in any other way taken apart, as can be done in the case of a "self-docking" dock. The overall length is 680 feet, the extreme width 144 feet, the height of the walls 66 feet, and the depth of the pontoons about 20 feet. At the bow end of the dock, there is a pair of pivoted flying gangways which give access from one wall to the other. The port wall contains living accommodation for workmen, and in the opposite wall is a range of workshops equipped with machine tools and other accessories.

At each end of the two side walls there are two steam boilers, and at the base of the walls are steam-driven centrifugal pumps, supplied by Messrs. Gwynnes, for controlling the lifting of the dock. From the valve house in the starboard wall forward, the dockmaster has complete control, by means of electro-pneumatic valve gear, water level indicators, and a telephone system. On the top of each wall there is a five ton electric traveling crane, and also four powerful steam capstans to be used for warping ships into the dock. An electric generating plant is installed in each wall. Apart from machinery and equipment, about 12,000 tons of steel plates and angles have been used in the construction of the dock.

CANADA'S NAVAL SERVICE.

IN a few weeks, the Canadian cruiser Rainbow will be depleted of half of her complements, as the agreements under which the men signed on are about to expire and 50 of them will return to England, leaving the cruiser half-manned and with no prospects of securing more men.

Recruiting in Canada a Failure.

When the late Government launched its navy scheme with the old cruisers Niobe and Rainbow, the ships were manned by Royal Navy men, who signed on with the Canadian Government, some for two years, some for three years, and a small number for five years. The men worked the ships out to Halifax and Esquimalt, respectively, and were full of enthusiasm at the beginning. In the case of the Rainbow she paid her first visit to Vancouver on November 23, 1910, but the reluctance of the Canadian boy to go to sea was something which could not be foreseen, and so the Rainbow has been on the coast twenty months and the recruiting has been an absolute failure.

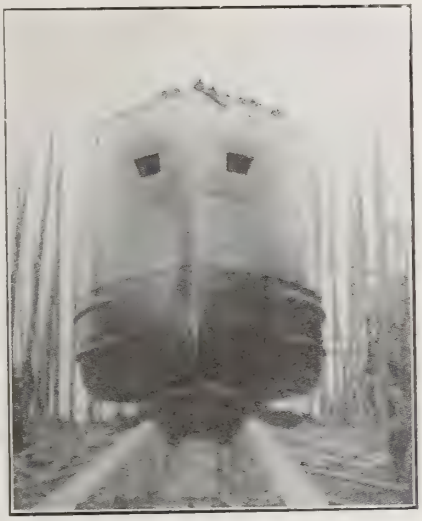
Men Have Grievances.

Furthermore, the cruiser has also lost a number of the Royal Navy men who came out for instructional purposes. The last time the cruiser was in Vancouver she was shorthanded below and did not muster a full sea watch on deck. The two-year men, whose time is up shortly, are all going back to England, and the Rainbow seems destined to become a fixture at Esquimalt dock yard for no recruits have come on.

It is claimed that the sailors have not been delighted with the treatment meted out to them by the Canadian Government. The pay and victualling allowances are lower than the scale obtaining in the Australian service, and another matter to cause discontent is the fact that the men on the small tugs used for Government fisheries protection are drawing nearly double the pay of the trained men on the Rainbow, who have been engaged in similar work.

Will try to Recruit.

It is stated that the Rainbow is going out of commission until next January, owing to shortage of men. The contingent for England will proceed to Halifax and there join the Niobe, which it is said, will convey them to England, and while there will undergo extensive repairs.



"FORDONIAN" BEING LAUNCHED.

An effort will be made by the Canadian authorities to induce more blue jackets from the Royal Navy to volunteer for the Dominion service, and if these men are secured for the Rainbow they will cross the Atlantic on the Niobe when she returns.

GREAT LAKES MOTOR SHIP "FORDONIAN."

ON July 2, there was launched from the yard of the Clyde Shipbuilding and Engineering Co., Port Glasgow, the motor ship "Fordonian," a vessel of more than usual interest to the marine world.

She has been built to the order of Messrs. J. W. Norcross & Co., Toronto, and is for package freight carrying on the Canadian Lakes. She is 250 feet between perpendiculars by 42 feet 8 in. beam by 16 ft. 10 in. moulded depth to main deck and 26 ft. 6 in. to awning deck, and is to Lloyd's highest class. Like other steam vessels in the Great Lakes trade, some of which have been built by the Port Glasgow firm, she has a long well deck amidships, with raised poop and forecastle, and has the chart-house and navigating bridge situated right forward. Her engine-room is aft, a practice also carried out in the existing steam vessels in this service, and here is arranged a four-cylinder Carels-Diesel two-cycle set of 800 b.h.p.

The entire machinery, with the exception of the cylinders, which were cast and bored out at Ghent, was constructed by the Clyde Shipbuilding Co. under the license which they hold from Messrs. Carels Freres, Ghent. No fuel will be carried in the vessel's bottom; on the other hand, there will be one large tank in the engine-room and two tanks above, in the 'tween decks alongside the engine casing.

The Fordonian will have a much greater radius of action than her steam-driven sisters. The winches, steering gear and windlass will be steam driven, and for this purpose a donkey boiler is arranged aft in the main 'tween decks. This boiler will be oil fired and will consume the same fuel as the main engines.

BRISTOL AND CANADIAN SHIPPING.

"BRISTOL is the best British port for Canada," states Sir Frank Wills, Lord Mayor of that city, who together with Mr. G. C. Palliser-Martin was recently in Toronto. Sir Frank points out that his city should be the centre of the Canadian trade, because it has a population of ten million people—more than the population of the Dominion—within a radius of one hundred miles of it. The Lord Mayor added that the Canadian Northern had promised a weekly service to Bristol. At the present time the company is understood to be considering the extension of its steamship service, but both President and Vice-President have announced that nothing definite has been decided upon.

Sir Frank and Mr. Palliser-Martin are in Canada in order to attend the opening of the Cabot Memorial at Halifax. Cabot was the first man to land in North America and sailed out of Bristol on his voyage of discovery. The deputation will present a bronze bas-relief of Cabot's departure from Bristol on behalf of that city.

MARINE ENGINEERING of Canada

A monthly journal dealing with the progress and development of Merchant and Naval Marine Engineering, Shipbuilding, the building of Harbors and Docks, and containing a record of the latest and best practice throughout the Sea-going World.

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Vol. II AUGUST, 1912 No. 8

CANADA'S ATTITUDE ON NAVY QUESTION.

ALTHOUGH no definite information is available as to what is projected, relative to Canada's decision on the navy question, we cannot think otherwise than that the visit to Great Britain of a number of responsible members of our Government, and the conferences and functions in which they have participated will not only be fruitful of long delayed direct or indirect Imperial support, but make at the same time for the establishment on our shores, lake and ocean, of shipbuilding and marine engineering industries for the upbuilding and development of our commerce.

THE PANAMA CANAL.

THE question of tolls, or more particularly the exemption from tolls of American vessels using the Panama Canal is a subject which is presently engrossing in large measure the attention of nations interested in the world's commerce. An attempt is being made, ear-marked by probable accomplishment, in the meantime, at any rate, to discriminate in favor of American shipping, a contingency entirely at variance with treaty obligation, and, further, as we take it, entirely antagonistic to precedent and practice as exemplified by the people of the United States in the past.

The bill, to confer favors on American shipping, awaits only President Taft's approval and signature, before becoming law, and latest reports indicate a hesitancy on the chief executive's part to committing not only himself but his country to what is undoubtedly ill-advised legislation. Should the proposal materialize, there is sure to result not only a determined attempt on the part of other commercial nations to claim an independent hearing and decision on the point at issue, but, in addition, an almost irretrievable loss of confidence in those whose privilege it is to direct the affairs of the great republic. It looks as though the work of establishing herself during the past decades, as not only the most progressive but also the most broad minded of the world powers is liable to be thrown to the winds and counteracted in a moment of misguided enthusiasm and selfishly inclined desire to make the Panama Canal a means of attaining shipping prominence at the expense of others.

We are glad to note, however, that a large and influential section of business interests and of the American people generally, are not hesitating to brand the proposed legislation as absurd, and we are extremely hopeful that their efforts will meet with success; avoiding, as it will, unnecessary and complicated discussion, and reflecting, as we have been accustomed, the generous and tolerant attitude to the rights and claims of others.

BRITAIN'S "TITANIC" INQUIRY.

THE finding of the Court of Inquiry held in Great Britain concerning the disaster to the White Star Line Steamship "Titanic" was recently publicly announced in somewhat lengthy detail by the Chairman, Lord Mersey. The man in the street, however, has, we are afraid, not had much additional enlightenment vouchsafed him, beyond that previously acquired through sifting the newspaper reports and what the American Inquiry divulged.

Disaster and achievement have become in large degree commonplaces of the age in which we live, and, therefore, the opportune time to concentrate on their features is of necessity immediately after their being recorded. Public opinion has, comparatively speaking, long since placed the responsibility for the disaster, and allocated its commendation and condemnation to those deserving each, respectively. Senator Smith's report was a highly colored, extravagant display of language, whose evident intent was to put the man's personality in the limelight, while the gist of the British Inquiry finding showed Lord Mersey to be a past master in the art of wielding the white-wash brush. To all appearance Captain Lord of the "Californian" has been made the scapegoat, and as somebody had to fill the breach, the fact that he presumably committed an error of judgment in diagnosing the "Titanic's" plight, gives the desired opportunity to overshadow the real crux of the issue—a continuance of break-record speed despite warnings of, and when surrounded by, ice dangers. It may possibly give smug satisfaction in some quarters to know officially that the blame for the disaster cannot and may not be placed; at the same time, it is no stretch of imagination to believe that the sinking of the Titanic may mean a lifelong legacy of unrest to some, because of their failure to play the man, no matter the price involved. Further, it is significant of human nature, that in the hour of test, material considerations, we might say, nearly always outweigh a man's moral obligation, even with respect to himself.

It is no compliment to our 20th Century civilization that we are thus easily influenced. Progress and development are in the very nature of things interwoven with distress and disaster, resulting from human weakness and error, and what the past has recorded, the future will continue to furnish in probably equal measure. Looked at from a moral and reasonable standpoint, it should never be necessary, no matter the occasion, for those directly responsible for a lesser or greater material loss, to make sacrifice, if opportunity to save themselves can be grasped, because of the want of nerve to face public opinion. Mob opinion, so largely in evidence in many forms of government, is not public opinion, and will fortunately never supplant the latter, which, while exacting in its demands for satisfaction, is always prepared to act charitably toward the manliness which owns the errors arising from human weakness. Recognition of our fallibility in larger measure is a consummation to be desired.

Notable Personalities of Canada's Merchant Marine

The Part That Shipbuilding, Marine Engineering and Shipping Companies Have Played in Bringing Canada Prominently Before the Eyes of the Civilized World, Has Not, We Believe, Received That Credit of Performance Which is Its Due. We Hope in This Series Dealing With "Notable Personalities of Canada's Merchant Marine," to Show That Those Who Have Bridged The Trackless Ocean to our Shores, and Provided the Facilities for Our Disembarkation, Are Worthy of at Least a Sentimental Regard.

FREDERICK WILLIAM COWIE, B.A. Sc. (McGill) M. INST. C.E., M. Can. Soc., C.E.

MR. F. W. COWIE was born in Ontario, March 27th, 1863. His father, John Cowie, Esq., is still living at Caledonia, Co., Haldimand, Ont. Early in life, Mr. Cowie chose his profession and commenced his studies with a view to civil engineering. He was educated in public and high schools at Caledonia and in Woodstock College, Woodstock, Ont., until 1883, when he entered McGill University, Montreal, from which he graduated in 1886 with honors in civil engineering. In 1885 he spent his five months vacation as engineer of the Canadian Niagara Falls Park Commission, under Col. Sir Casmir Gzowski, its chairman.

Early Profesional Career.

In 1886, immediately after graduation, Mr. Cowie was appointed assistant on the staff of Mr. John Kennedy, chief engineer to the Harbor Commissioners of Montreal. Working under one of the most eminent engineers which the 19th century produced, Mr. Cowie immediately commenced the study and practice of that branch of the profession, of which he is now a recognized authority. In the harbor of Montreal, on the St. Lawrence ship canal, and on the Montreal Flood Commission, Mr. Cowie's early professional years were spent under the guidance of Mr. Kennedy, Mr. T. C. Keefer, C.M.G., Mr. Percival W. St. George, C.E., Mr. W. L. Scott, C.E., and Mr. James Howden, M.E. In 1892,when the St Lawrence ship canal was taken over by the government, he was transferred to the Department of Public Works, where he had charge of important work on the St. Lawrence River and on many of the inland harbors of Ontario.

Chief Engineer Montreal Harbor.

In 1897 he was appointed resident engineer, and in 1900 superintendent engineer in charge of the operations whose aim was a 30 ft. ship channel between Montreal and the sea. On this work, Mr. Cowie attracted the attention of the Transportation Commissioners, the shipping interests and other public bodies interested in the development of trade and navigation to and from Canada and as a consequence he rapidly rose in the esteem of the Minister of Marine and Fisheries to be one of the recognized authorities on questions pertaining to navigation in that department.

In 1907, on the reorganization of the Montreal Harbor Commission and on the retirement of Mr. John Kennedy owing to failing health, the Harbor Commissioners sought the services of Mr. Cowie, and with the approval of the Minister of Marine and Fisheries appointed him to the position of chief engineer, and until the end of the fiscal year of 1908 he filled that position as well as continuing



F. W. COWIE, B.A.Sc., (McGill)
Chief Engineer, Montreal Harbor Commission.

in charge of the ship channel operations.

Inspection Tour of European Ports.

In 1908, Major George W. Stephens, president of the Montreal Harbor Commissioners and Mr. Cowie, representing the Government, made a tour of inspection of European ports, with a view to determining the best measures to be adopted in connection with harbor development in Canada. After an earnest examination of every large port in Europe, a volume was published by Major Stephens and Mr. Cowie, entitled "Report on British and Continental ports with a view to the Development of the Port of Montreal." This report was reprinted in English and French by the Marine and Fisheries Department, and is now the standard authority on the principles of port development in North America.

The Harbor of Montreal.

Mr. Cowie's services in connection with Montreal harbor in recent years is well known. No public work in Canada has attracted such attention or met with such public approval as the Montreal harbor extensions and the deepening of the St. Lawrence ship canal. In 1908, the plans were made, and in 1909 they were examined by a Board of Consultative Engineers, approved of and adopted by the Government, and work started in a vigorous manner and with full public approval in April, 1910. The construction work in Montreal harbor is almost entirely carried on departmentally, the staff arrangements and plant of the Harbor Commissioners being recognized as a standard for all Canada.

Society and Club Connection.

Several of Mr. Cowie's addresses and papers on navigation in the River St. Lawrence, winter navigation, etc., have been published from time to time, and received with marked attention At a recent meeting of the Canadian Society of Civil Engineers, Mr. Cowie discussed the matter of Engineers' Estimates in Canada, and advised the members of the society that if the rank and file of engineers were expected to hold the position which they should, the reliability of estimates must be more generally cultivated. Mr. Cowie resides at "The Linton," Montreal, and Portneuf, Que., while his clubs are the Rideau, Ottawa, St. James,' Canada, Jockey and Montreal Country Club.

It seems meet and appropriate, together with the featuring of the Montreal ship dock "Duke of Connaught," that the man, who has contributed so largely to the development of the River St. Lawrence and the harbor of Montreal, as to make this dock not only a requirement but an accomplished fact, should also be given due prominence in the same issue. Perusal of the ship dock article, will, we are sure, serve to impress the reader with a more comprehensive idea of the scope of Mr. Cowie's achievements than has been possible to compress into the small compass of this brief sketch.

MARINE MOTOR ENGINES.

A PAPER on "The Importance of Design in Motor Engines for Marine Work" was presented recently before the Institution of Automobile Engineers by Mr. R. G. L. Markham, who discussed various features from the standpoint of the steam marine engineer.

Three General Types.

He divided motors for marine purposes into three general types:—(1)—The high-speed light petrol engine, with a subdivision in which refined paraffin was used as the fuel; (2)—The heavier, slower-running type, using heavier petroleum fuel and generally known as the semi-Diesel type; and (3)—the Diesel type proper, suitable for high powers and large vessels, where weight was not of importance. He urged strongly that all draughtsmen should have practical experience of the working conditions of the engines they were called upon to design, and this practical experience should consist not only of running the engines when they were in proper order, but also of taking them adrift to get at any part needing examination or repair.

High Speed or Light Type.

For the light type of engine, the conditions to be observed were first that there should be as complete prevision and provision against breaking down as was humanly possible; and, secondly, extreme accessibility so that a breakdown might be remedied quickly. All detail parts such as carburettor, pumps, and ignition gear, should be so mounted that they were readily examined, and that no one part interfered with access to another. The piston should be accessible from the crank case without the need for taking off a cylinder.

Slow Speed or Heavier Types.

In the second class of engine simplicity and substantial construction became of far greater importance than in the first or light class, since the men who had to look after them were those who did not treat them with the care the designing staff might think desirable. With regard to the Diesel type—which meant machinery for ocean-going ships—there appeared to be no reason for departing from the general features of design found in the present day steam engine. These had been evolved from years of experience, and the prejudices of the marine engineer were in favor of their continuance, while good reasons could be quoted against many of the innovations proposed by firms who were in the first place purely gas-engine builders, and who had had no previous experience of marine motor building. A Diesel engine should be of the ordinary steam-engine type so far as possible, with piston rod and cross heads, and the piston should be capable of being taken out in such a way as not to necessitate the breaking of a large number of joints.

The author also discussed a number of other points, such as the kind of fuel to be used, four-stroke and two-stroke engines, methods of reversing, starting arrangements, lubrication, position of valve gear, and governing.

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STEAMSHIP CENTENARY CELEBRATIONS.

THE centenary of steam navigation in British waters on a practically successful engineering and commercial scale, as represented by the launch and plying on the river Clyde of Henry Bell's steamboat Comet in 1812, is to be celebrated by Glasgow and other Clydesdale communities in various ways this month.

An exhibition illustrating the history and developments of steam navigation, which it was intended should be opened to the public on the 24th of the present month—the date corresponding to that of the launch of the Comet—is to be postponed owing to the absence from Glasgow at that time of the Lord Provost, who has taken a warm interest in the project of the exhibition as well as in the subject generally, and will take place on Tuesday, August 6th, the centenary of the date on which the Comet arrived for the first time at the Broomielaw Quay, Glasgow.

With the sanction and under the auspices of the Glasgow Corporation, and under the supervision and management of the Museums and Art Galleries Committee of the corporation, aided by an honorary advisory committee consisting of gentlemen connected with the profession and practice of shipbuilding and marine engineering on the Clyde, an exhibition has been organized and will be held in the Kelvingrove Museum and Art Galleries from a date early in August until December 31st.

Arrangements are also being made to celebrate the centenary on Saturday, August 31st (the Glasgow trades' holiday) by a grand display of shipping at the Tail of the Bank, in which not only the Clyde Trustees, the shipowners and shipbuilders of the Clyde and Forth districts, but the shipowners elsewhere whose vessels trade to and from the Clyde, and the British Admiralty will take part. Moreover a systematic appeal is being made for funds to found one or more "Henry Bell" scholarships in the Glasgow Royal Technical College, and if sufficient money is forthcoming, a suitable steamship is to be purchased and handed over to the Technical College to be utilized for the training of students in the practical work of engineering and seamanship.

LLOYDS' REGISTER OF SHIPBUILDING.

BEARING upon the prosperous condition of the shipping trade are the quarterly returns of Lloyd's register of shipping. These figures constitute an absolute record in the history of ship construction. On June 30, there were, excluding warships, no less than 529 vessels of about 1,776,000 tons gross under construction. This number included 492 steamships of 1,762,900 tons and 37 sailing vessels of 11,000 tons.

The total shows an increase of 87,000 tons on the preceding quarter and of 298,000 tons as compared with a year ago. It is perhaps less satisfactory that warships under construction also constitute a record at 503,000 tons against the previous highest of 454,100 tons in 1900. At the present time there is little doubt that freight rates are high and generally rising. At the same time, if the present rate of output of new ships is maintained, some of them will be placed on competitive routes.

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BRITISH NAVAL DISPLAY.

THOSE who were fortunate enough to be present at the recent inspection of the British fleet witnessed the most memorable and splendid display of naval strength that the world has yet seen, says the "Times," while all authorities admit that the inspection of the Home Fleets, organized by Mr. Churchill for members of both Houses of Parliament has been a complete success. There was an interesting flying display, a torpedo attack upon the leading flagships at the eastern end of the columns, and an exhibition of the offensive purposes of submarines and destroyers. As the special correspondent of the "Times" remarked, it was a pity that this mighty fleet could not be seen by the great mass of people it was designed to protect.

Departure of the Fleet.

At 5 o'clock the signal was made for the fleet to weigh, and precisely to the moment, continues the above writer, the long line of cruisers in column "C" began to move away to the eastward. In stately ordered precision, led by the huge battle cruiser "Lion," each ship maintaining her distance from the one ahead of her, at a speed of eight or ten knots, the First, Second and Third Cruiser Squadrons passed away up Channel and out of sight. Two more divisions of cruisers followed in single file, and then came the battleships in two columns of divisions in line ahead. The relative positions of the ships in the columns and of the columns to one another were maintained with faultless regularity, except when at times the passage of in-

dividual ships was obstructed by crossing boats. The ease with which they answered their helms at alterations of the course testified to the handiness of the vessels and to the experience and ability with which they were manoeuvred.

These huge warships when in motion are a much more interesting and impressive sight than when at rest, and never can the majority of the spectators have seen so many under way at one time. To add to the dignity of the spectacle, the rain clouds threw a subdued shade on the grim grey hulls, painting them in more sombre tones as they moved majestically through the still laden sea. It is almost impossible to convey an adequate idea of the wonder of the scene as the long line of ships passed out of the anchorage and were lost to sight in the far distance.

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MOTOR BOAT CROSSES THE ATLANTIC.

THE thirty-five foot motor boat Detroit, under command of Captain Thomas Flemming Day, of New York, arrived at Queenston, Ireland at half past eight o'clock on the morning of August 7, after a voyage from New Rochelle, N.Y., which occupied nearly twenty-four and a half days. This was the second leg of a contemplated trip of the motor boat from Detroit, Mich., to St. Petersburg. The voyagers were welcomed by great crowds of people, the Chairman of the Harbor Board, the President of the Town Council and other officials, who extended their congratulations to Captain Day. In an interview the captain declared that he never was in a better boat. She did not prove a good runner, however, but could lie to and ride perfectly. A defect in her design was the low midship deck. As a consequence, she shipped plenty of water, but was at no time in any danger. Captain Day further said that he had proved the feasibility of a motor boat race from New York to Europe, and he believed that a cup for such an event would be offered at an early date.

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Canal d'Orleans.—Pumping water into a canal in order to render it navigable has been accomplished in the case of the Canal d'Orleans in France. This waterway, which connects the Loire River to the Loring Canal, and thence to the Seine, was formerly fed by thirteen reservoirs and several small streams, but this supply did not prove adequate for the required traffic depth. To remedy this condition a so-called canal regulator has been established at a point on the Loire River, and the water is lifted from this stream to the canal by means of electric pumps.

Questions and Answers

By Calliope.

28.—Q Superheated steam is being largely adopted in steam engine and steam turbine practice. Indicate briefly why?

A. To minimize the losses of efficiency and economy which are unavoidable to a lesser or greater extent from condensation in the steam pipe between boiler and engine, and in the engine cylinder by the expansive use of the steam there. What goes to make the proposition attractive, is the fact that the superheat required does not involve extra fuel cost, the otherwise waste heat being utilized in its attainment.

* * *

29.—Q. With a high degree of superheat, what precautions are necessary?

A. Careful design and constructional detail of the stop valves and steam piping between the superheater and the engine; of the piston and valve of the first cylinder into which the superheated steam enters and an efficient reliable system of cylinder lubrication.

* * *

30.—Q. What are the two systems employed to superheat saturated steam?

A. The first and most common arrangement consists in placing the superheater in the flue space of the boiler to abstract the necessary heat from the hot gases. The second arrangement depends on a separate furnace for imparting the superheat.

* * *

31.—Q. To what strains are the piston and connecting rods of a steam engine subjected?

A. When the piston is moving toward the shaft, they are each under a compressive strain and on the return stroke they are subject to a tensile strain. The compressive strain is the more severe, hence the practice of increasing the connecting rod diameter at the middle of its length or of tapering it from inner to outer end.

* * *

32.—Q. What is meant by expression "capacity" as applied to pumps and pumping engines?

A. By "capacity" is implied the quantity of water delivered in a given time. It is expressed as thousand gallons per hour or million gallons per 24 hours, according to size of unit.

* * *

33.—Q. Explain how you would calculate the horse power necessary to raise 1,000 Imperial gallons through a total lift of 75 feet in one minute?

A. The first requirement would be to bring 1,000 Imperial gallons to pounds. This is arrived at by multiplying 1,000 by 10, there being 10 pounds of water in an Imperial gallon. The result, 10,000 pounds multiplied by 75 feet lift shows that 750,000 foot lbs. power are necessary. As 33,000 foot pounds equal 1 horse power, 750,000 divided by 33,000 will give 22.72 horse power required. Pump efficiency is generally low, however, amounting to 50 per cent. or thereabout, and, therefore, necessitates provision being made in execess of the above horse power, which is theoretical. If the efficiency is, say 50 per cent., we arrive at the proper horse power by multiplying 22.72 by 100 and dividing by 50. Thus

$$\frac{22.72 \times 100}{50} = 45.44 \text{ Horse Power.}$$

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"EMPRESS OF BRITAIN" AND "HELVETIA" COLLISION.

THE C. P. R. steamship Empress of Britain and the coal freighter Helvetia collided in the Gulf of St. Lawrence during a dense fog on July 27, as a result of which the latter vessel was sunk. The investigation into the cause of the collision was opened in Quebec on August 1. The court was composed of Captain Lindsay, commissioner of wrecks, with Captains Cliff and Nash as nautical assessors. Mr. Pentland represented Captain Murray and the officers of the Empress, and Mr. Holden, of Montreal, represented the officers of the Helvetia.

Empress Captain Testifies.

The first witness called was Captain Jas. A. Murray of the Empress of Britain, who said they left Quebec about 7.30 p.m. on July 26, and proceeded full speed down the river to Father Point, the weather being fine. They left Rimouski at 8.20 a.m. on July 27, the weather being fine down to Cape Chatte. When they passed Martin River, about 3 miles distant, they got into a bank of fog. Speed was then reduced to six knots an hour. At 3.15 it became clear again and the ship was put at full speed.

At 4.02 the haze came on again, as a result of which the speed was reduced and lookouts stationed at the stemhead and in the crow's nest. The first and the third officers were on the bridge, and the whistle was kept going regularly. At 4.37 p.m., the lookout reported something on the starboard side, but nothing developed. Shortly afterwards, the fog got thicker, and suddenly they saw a steamer on the starboard side of the Empress.

The Empress' engines were reversed. He could not say how long it would take to go astern. They had been doing

twelve knots an hour when they saw the vessel immediately ahead. The other vessel was at right angles with them. About half a minute after they saw her they struck the other vessel. After the accident all hands were called to quarters and orders to swing out the boats were given. The Helvetia was struck abaft the engine room. The captain said he pressed on, when he saw that the other ship was damaged, to keep her from sinking.

When all were saved he backed off, and the Helvetia sank rapidly. He held her up 49 minutes. The captain said he only heard a fog horn once before the collision. He thought the Helvetia was on a port helm some time before the collision.

Captain Murray then described, with a model, the position of the two ships at the time of the accident. The whistle he heard might have been Fame Point. The fog cleared immediately after the collision.

Helvetia Skipper's Story.

Captain Connell, of the Helvetia, said he left Cape Breton on July 26 at 9.30 a.m. He met fogs from Cape North to Fame Point. On July 27 at 4.15 p.m. he met large banks of fog and ordered half speed, which meant six miles an hour for the Helvetia. Soon after, the weather becoming clear, he ordered full speed and then left the bridge to take a cup of tea. While he was down stairs, he noticed an order for half speed and heard two blasts, then three. While the engines were stopped he rushed on deck and saw the Empress. He ordered full speed to avoid a collision but it was too late. The Helvetia was going at about five miles an hour when she was struck. The witness was allowed to speak of what he actually saw. He said if the Empress had not been checked in her advance the damage would have been much greater.

To Mr. Cook witness maintained that the Helvetia was struck when going from starboard to port.

Other Witnesses.

In answer to the Court, Captain Walsh remarked that the port anchor was bent and the hawser broken. The Helvetia was locked into the Empress, about fifty-six tons of the former sticking to the latter when they separated. The wreckage would not have locked the Empress if she had not been going slowly.

Mr. Phipps, chief engineer of the Empress of Britain, deposed that he had been on the vessel six years and had no trouble in reversing the engines. It would take ten or twelve seconds to stop the engines and put them going astern. A watch was put on from the time of leaving Quebec until the steamer was clear of land.

J. Clark, chief engineer of the Helvetia, said there were four engineers on the Helvetia. Before the accident the ship travelled at full speed, ten knots, in clear weather, but five or six knots when there was fog, or half speed. Witness heard a horn and then saw the bows of the Empress. She came on them direct.

H. Whitney, senior second engineer on the Empress of Britain, said he was in charge of the starboard engines. At 4.55 he got orders to stop and then to go full speed astern. The Empress was going half speed at the time.

The second engineer on the Helvetia said he was washed into the stoke hold after the collision and got up the stoke hold ladder.

Louis Boyer, pilot of the Helvetia, testified to hearing three blasts from a steamer. He recognized the blasts as those of the Empress.

This concluded the investigation.

The Judgment.

"In the finding of the Wreck Commission," the judgment says, "the Court, having carefully weighed the evidence adduced, which was given in a perfactly straightforward manner by both sides, found that the Empress of Britain is alone to blame for the collision, inasmuch as the speed at which that vessel was proceeding prior to the accident was excessive, considering the state of the weather at the time.



C.P.R. LINER "EMPRESS OF BRITAIN" AFTER COLLISION WITH S.S. "HELVETIA."

"Exception was made at the investigation to the action taken by the master of the Helvetia when the Empress was sighted, but in view of the close proximity of the two vessels and the speed of the Empress, the Court is of the opinion that the collision was unavoidable, and the Court is also of the opinion that as the Helvetia was under a port helm with engines stopped when the Empress of Britain was sighted, the master of the Helvetia adopted the best course open to him under the circumstances.

"The Court therefore censures the master of the Empres sof Britain, but on account of his previous good record, the skillful manner in which he handled his vessel after the impact, and the efficient way in which steps were taken to rescue the crew of the Helvetia, does not deal with his certificate."

Marine News From Every Source

British Columbia

New Westminster—Plans of the proposed harbor at New Westminster have been submitted to the city by the engineer, Mr. A. O. Powell, of Seattle, Wash. In their full extent the plans afford a waterfront of fifteen or sixteen miles and call for the dredging of a waterway along the Annacis Channel, four miles long. They also indicate the reconstruction of Front street along the face of the city proper and the building of an unbroken harbor line. Approval is now being sought to submit a by-law to raise $500,000, the city's share of the proposed improvements.

Vancouver — Angered by the action of the United States Senate in discriminating in favor of American vessels in formulating rules for the conduct of the Panama Canal, British Columbians are talking of boycotting the Panama-Pacific Exposition in San Francisco in 1915. Mr. A. B. Erskine, President of the Vancouver Board of Trade has issued the following statement: "A special meeting of the board will be called to discuss whether the people of this city and Province will withdraw from participation in the San Francisco Fair. I see that the British Government is considering the same course. I am convinced that this is the only dignified thing to do in view of the action of the United States Senate in repudiating American treaty obligations. The Exposition would mean much to us locally, but the issue at stake is too big for minor selfish considerations to weigh heavily."

Fraser River — The Department of Marine and Fisheries are making preliminary arrangements for the erection of a lighthouse on this river. Tenders will be called for its construction soon.

Vancouver — The local customs department have received instructions from Ottawa to collect the duty on fuel oil. Fuel oil of a certain specific gravity, with a flash point under 200 is exempt from duty, but the Canada Shipping Act, section 609, says that fuel oil for use on steamers must be over 200. The fuel oil used on the C.P.R. steamers has a flash point varying from 240 to 280. Shipping men are wondering what the outcome will be, for if the duty is enforced it will seriously affect not only the C.P.R., but also the G.T.P., the Sugar Refinery, the Boscowitz Steamship Company, and the Up-Inlet Oil Works. Steamers will be unable to bring their fuel oil here and it may lead to their bunkering at Seattle. One steamship official raised the point as to whether fuel oil was a product of the United States, and so liable. He argued that it was a by-product of crude oil.

Victoria — The steamer Fulton, which is engaged in freight service for Dodwell and Co., between Victoria, Vancouver and Puget Sound Ports, under the United States registry, has been seized by the United States customs. The vessel is held pending decision of the United States district court on the ground that she is sailing under a void certificate of registry. The information, which demands penalties of $31,143 against the vessel, charged that the Fulton has been engaged in coastwise and foreign trade for a long period in violation of the United States maritime regulations. It is alleged that since the steamer was sold by the Fulton Steamship Co., to her present alleged owners, the Montesano Steamship Company, some years since, the latter has neglected to deliver up to the government authorities her license and certificate of enrollment, and that it neglected to renew same. Also, that between January 19, 1907, and July 5, 1911, she was engaged in the coasting trade without either license or enrollment, and that from July 5, 1911 to April 4, 1912, she was engaged in foreign trade without a valid certificate of registry, arriving at 150 ports and places within the jurisdiction of the United States in violation of the federal maritime regulations.

Victoria—July 19.—Details of the seizure of the American gasoline launch Bonita, of Seattle, by the fishery protection cruiser Newington were given recently at Esquimalt by officers of the cruiser. The Bonita, which had only two men aboard, was captured after a running fight in which a score or more of rifle shots were fired at the Americans by Captain Ledwell, of the Newington. No one was injured. The American boat was not captured until she had been rammed and capsized, and her crew thrown into the water. The Newington sighted the Americans trawling within the three-mile limit off Nitenat early in the morning. "What are you doing there?" called Ledwell from the cruiser. "Making a passage," the Bonita answered. "What are you doing with your trawls out?" There was no reply, but the Bonita altered her course and started off. Ledwell fired a shot across her bow and followed this up with a fusilade. The two Americans crouched low in their boat and steered a constantly shifting course in an effort to get to safety beyond the three-mile limit. The Newington circled around them, Ledwell continuing to fire at intervals. Finally, the cruiser closed in and struck the launch amidships, rolling her completely over. The men on board leaped as their craft capsized. The two Americans, whose names are not given in Ledwell's report, were taken out of the water and made prisoners on board the Newington, which proceeded to Esquimalt, where Ledwell turned the Bonita over to the resident officer of his Majesty's navy.

Vancouver — T. G. McBride and Co., have placed in service in Vancouver harbor, a new steam tug named Moonlight. She was built in Vancouver, and has a displacement of 42 tons. The dimensions are: Length, 70 ft., beam, 16½ ft., draught, 7 ft. She made about 10 miles an hour on her trial trip.

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The Great Lakes

Port Colborne, Ont. — Mr. J. A. Jamieson, of Montreal, has been commissioned by the Federal Government to design an addition to the Port Colborne grain elevator, increasing its capacity from 800,000 to two million bushels. Mr. Jamieson, who is a well known expert, designed the present structure, and this has proved eminently satisfactory, being both rapid and economical in the handling of grain.

Sarnia, Ont. — Before leaving for Marquette to look after the damaged

steamer Rensselaer, which sank the steamer Gayley. Capt. W. W. Smith, who has charge of the blowing up of the steamer Joliet, which was sunk abreast off this port, said that she is all blown away except from the stem to the forward bulkhead, and that with good luck he expects to have her cleared out of the channel at an early date. Mr. Longton, of the Department of Marine, Ottawa, is coming here with a sweep which will be used to take soundings of the river where the Joliet was sunk.

Ottawa, Ont. — The Railway Department is going ahead with the plan for the Prince Edward Island car ferry. Proposals have been invited from two leading firms in Canada, the United States and Europe, which build such ferries, and they will be received up to August 15th. The service is to be operated between Cape Tormentine, N.B., and Carleton Point, P.E.I., a distance of ten miles, and the gauge of the P.E.I. railways is to be increased to standard.

Ottawa, Ont. — Formal notice is being issued giving effect to the Act passed last session for the employment of certificated masters and mates on ships of five tons and over, but some important exceptions are being made. The Act will not apply to purely pleasure yachts, barges, fishing boats, or to sailing ships engaged in the coastwise trade of not more than 100 tons, propelled by auxilliary power other than steam, and employed partly in fishing and partly in the carriage of freight.

Welland, Ont. — It is reported that the contract for the extension of the present pier at Port Colborne, to provide additional docking facilities for steamers engaged in carrying grain, has been let by the Government to M. J. Hogan, at a cost of $21,300.

Welland, Ont. — The dredge Ferguson, recently completed by M. Beatty & Sons, Welland, builders of dredges and contractors' plant, has left for Halifax, Nova Scotia, having been purchased by Beasley Bros. to do dredging in that vicinity. Two tugs took her to Port Dalhousie, from whence the Montreal Towing Co. took her to Montreal, and thence the Halifax Towing Co. to Halifax. The dredge is complete and up-to-date.

Ottawa, Ont. — The Marine and Fisheries Department was advised today of the seizure at Barrington, N.S., of the American fishery schooner Hattie Heckman, owned by Wheland & Company, of Gloucester, Mass. The seizure was made by the cruiser Petrel, the offence being that of purchasing ice without a license. The treaty allows vessels of this character to go into port only for wood, water, shelter and repairs. No supplies can be taken on except by a specific authority. The Marine Department has placed the case in the hands of the Justice Department, with instruction to confiscate the vessel. The case will come before the Admiralty Court of Nova Scotia.

Red River, Man. — The Red River Navigation Association Congress adjourned after having completed arrangements for the Red River survey from the border to the lakes. Hon. Robert Rogers, Minister of the Interior, agreed that the Dominion Government would do its part to restore the ancient glories of Red River navigation. The Minnesota and Montana delegates asserted that the United States would take care of the deep boat channel from Grand Forks to the border. It is expected to have a line of public ownership boats, paid by the cities and municipalities, put on the old river route, unless private owners can be induced to invest in the project.

Sault Canals.—A new high record for the lake traffic through the Sault canals was established during the month of June. Nearly ten and three-fourths million tons were carried in both directions. The next best figure was made in July, 1910, when 9,975,173 tons were moved. The traffic through the canal promises to exceed that of any other during the year. The actual number of tons carried during June was 10,747,159, as compared with 7,476,087 in June, 1911, and 9,839,872 in June, 1910. In May this year 8,936,684 tons moved through the canals. Of this amount 5,003,436 tons were moved through the United States canal and 5,742,723 through the Canadian Soo.

Sault Ste. Marie, Ont. — Water has again made its appearance in such quantities that work has been cut short on Section No. 2 of the MacArthur new lock contract. Sand and gravel are being used to stop the leakage until other means can be found. The water has reached such a height that dredging has been abandoned. The entire crew is now at work on the dam, and it is expected that the dredge men will be able to continue the latter part of the week.

Amherstburg, Ont.—To further safeguard vessels at Ballard's Reef the Canadian Department of Marine and Fisheries has chartered the tug D. A. McCarthy to patrol the dangerous channel, warn masters of dangerous spots, and assist boats in danger of striking. Heretofore, the Lake Carriers' Association has maintained a launch to keep vesselmasters posted about the channel. The service performed by the launch has been invaluable to vessel owners, but it could not prevent boats from stranding, while the McCarthy will be able to do so, provided she is near enough to get aboard.

Fort William, Ont.—The contract was awarded to Barnett & McQueen of this city for the construction of the new Fort William Elevator Co. grain house. The contract price was close to $700,000.

Toronto, Ont.—The yards of the Polson Iron Works present a busy aspect at the present time; several tugs and some larger vessels are under construction.

Port Colborne, Ont.—The contract for the extension of the piers to provide additional docking facilities has been awarded to M. J. Hogan at a price of $213,000.

Welland, Ont.—The Welland Dredging Co. of Welland, Ont., recently incorporated with a capitalization of $100,000 and of which W. E. Hardison is president, has purchased the Old Glory dredge and the Pauline Hickler from F. A. Sullivan, Detroit, and will transfer them to the Canadian register. The company has secured a Government contract for work at Kingsville, Ont.

St. Catharines, Ont.—Navigation in the Welland Canal was tied up for several hours as the result of an accident at Lock 23, near Thorold, when the steamer Wiley M. Egan, bound light from Deseronto to Ashtabula, crashed into the lock and carried away all four gates. Water from the upper levels rushed through the narrow enclosure into the lower level of lock 22, carrying the boat back some distance. Fortunately, there was no loss of life as was the case when the steamer La Canadienne carried away the gates at Lock 22. New gates were sent up from the gateyard at Port Dalhousie.

Welland, Ont.—The plant of Beatty & Sons, Ltd., dredge and shipbuilders, one of Welland's largest concerns, has been taken over by a Cleveland firm. The company's assets were valued at $600,000. The new management will make big extensions.

Amherstburg, Ont.—D. S. Ellis, C.E., professor of mathematics at Queen's University, Kingston, is here making an investigation of the cross currents in the vicinity of the Lime Kiln Crossing, Ballard's Reef and the new Livingston Channel, and also to take measurements of the discharge of water in the lower Detroit River. The data gathered by Prof. Ellis will be used in case of any action taken by the Public Works Department regarding the spoil pile created by the construction of the Livingstone Channel, and cross currents caused by this obstruction.

Toronto, Ont. — The new steel drill boat Faugh-a-Ballagh, constructed by the Polson Iron Works for John E. Russell, a contractor, was launched recently at the company's yards. The boat was christened by Captain Jo. Russell, a son of the owner. The new boat was built and designed for the special purpose of doing drilling, incidental to submarine blasting, and will be used at Trenton

and Deseronto this season. The boat is in the shape of a scow, and is 60 feet long, with a 32 feet beam, and a depth of 6½ feet. The cost is in the neighborhood of $26,000.

Toronto, Ont.—The Lake Simcoe Navigation Co., Ltd., has been incorporated under the Ontario Companies Act, with $40,000 capital, and office at Toronto, to own and operate steam and other vessels and carry on a general ship owning, navigation and transportation business. The incorporators are; R. J. Law, W. G. Simpson, F. C. L. Jones, I. M. Johnston and F. V. Dalton, Toronto.

Port Colborne, Ont.—An investigation into the cause of the accident in the Welland Canal at Port Colborne, when the Dominion Government steamboat La Canadienne, broke through the lock gates on June 20, was held at Port Colborne on July 5, before Capt. Lindsay, acting Wreck Commissioner, with Capts. Milligan and Atkinson, Port Colborne, as assessors. The blame for the accident was found to rest on the captain, Alex. Brown under extenuating circumstances, owing to the fact that little or no assistance was to be had from the crew, who were ignorant of their duties and careless, and that the master's orders were disregarded in the use of the snubbing rope on entering the first lock. The master's certificate will not be interfered with.

Amherstburg, Ont.—Another of the concrete cribs, which are to serve as foundations for the lights that will mark the lower section of the Livingstone channel, was pumped out last week by the Trotter Wrecking Co., and is ready to be placed.

Four are yet to be pumped out and raised from the bed of the dry work section of the channel. The steel tanks for the lights along the dry section were placed in the spoil banks several weeks ago. It is believed the lighting system will be probably ready for use by the time the new channel is ready for opening, which will be about September 1.

Sault Ste. Marie, Ont.—Going ashore in a dense fog, which overhung the lakes and St. Mary's River, the steamer Filbert, downbound, ore laden, blocked the West Neebish channel for a few hours. Traffic was not delayed to any extent, however, as the steamer Collingwood, noticing her predicament, pulled on the Filbert and released her.

Kingston, Ont. — The steamer La Monde was sold by public auction at the Davis dry-dock recently for $675, the highest bidder being J. M. Farrell, on behalf of the Union Bank of Canada. The boat was offered previously, but the sale was adjourned. The bank holds a mortgage on the boat.

Amherstburg, Ont. — While bound down at midnight, the steamer America, laden with iron ore, ran aground at Ballard's Reef.

Amherstberg, Ont. — The steamer W. L. Smith, which went aground at Ballard's Reef, was released after having been lightered. The tug Harding and the lighter Rescue carried out the work.

Port Colborne, Ont. — The oil-burning steamer Toiler passed down the canal recently with 101,000 bushels of bran, the largest cargo which has ever gone through the Welland Canal. The vessel is in charge of Captain Malone, who has sailed the lakes for fifty years.

Port Colborne, Ont. — While entering the Welland Canal at this port, the steamer India, in charge of Capt. Charles Beaupre of Kingston, smashed into the Grand Trunk Railway Bridge, badly damaging the bridge and the vessel's bulwarks. Her steam steering gear was also damaged. On entering the harbor it was Capt. Beaupre's intention to dock for some time, but in some manner his signals to go astern were mistaken by the second engineer, who was in charge at the time, and the steamer kept going rapidly forward under a good head of steam. On nearing the passenger bridge, the tenders noticing the vessel's peculiar movements, were on the alert, and swung the bridge in the nick of time. Continuing along at a good speed, the vessel neared the heavy railway bridge, and a steel cable attached to a snubbing post, snapped like a string. When the vessel struck the bridge it swung like a top, one end striking the vessel amidships and stopping her. The pivots of the bridge were moved half a foot.

Amherstberg, Ont. — Wrecking tugs in the lower Detroit river, which were enjoying a rich harvest through the many strandings at Ballard's Reef, are in for an idle spell, as the dozen spar buoys placed there by the Lake Carriers' Association are preventing mishaps. Nine strandings occurred in rapid succession at the reef, all of which meant repair bills and loss of time. The channel is now so fenced in that an accident is impossible unless a steering gear goes wrong.

Ottawa, Ont. — The Canadian Department of Fisheries is co-operating with the Newfoundland and United States fisheries authorities in endeavoring to reach some joint agreement as to the abolition of steam trawling in Atlantic coast waters. The matter has been before the government for years, but the difficulties in the way of securing joint international action have so far prevented any satisfactory arrangement to prevent the admitted and growing menace of steam trawling both in regard to the gear of the regular fishermen and the conservation of the fisheries. Now all three governments have signified their readiness to co-operate in checking steam trawling as far as possible. The department here has placed two officers on board steam trawlers now operating off the Maritime Provinces, and they will report as to the conditions there. Similar action has been taken by the American and Newfoundland Governments. It is hoped that the joint legislation in the matter may be secured during the course of the next year.

Kingston, Ont. — During the month of July the amount of grain that came to Kingston en route to Montreal by the St. Lawrence was 1,539,148 bushels.

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Montreal and Quebec

Quebec, Que.—Sir William Arrol & Co., Ltd., of Glasgow and Montreal, have been awarded the contract for the large new 50 tons wharf crane with which the harbor commissioners are equipping this port. Next to the Montreal Harbor Commissioners 75 ton floating crane, which was also constructed by the above company, this machine will be the largest of its kind in Canada and will fill a long felt need at Quebec.

Quebec.—A serious accident occurred recently, whereby two men were severely scalded on board the steam yacht Semiramis, lying at the Cornwall Louise dock. The Semiramis, which is owned by Mr. C. B. Gordon, of Montreal, president of the Dominion Textile Company, has been lying in the Louise Dock for some time past. She was about to leave with some members of Mr. Gordon's family on a cruise. Just after steam had been raised, one of the steam pipes blew out, the escaping steam badly scalding Mr. Belanger, chief engineer, and Albert Marcoux, fireman.

Montreal, Que.—Mr. Arthur Piers, of the C.P.R. Steamship Lines is here for the purpose of consulting Sir Thomas Shaughnessy in regard to additions to the Atlantic fleet. When Sir Thomas Shaughnessy was in London in the earlier part of the year, tentative proposals for a cruiser fleet to be run by the C. P.R. were discussed with representatives of the British Government, and the Hon. Mr. Hazen has admitted that the matter has since been a subject of negotiations between the British Admiralty and the representatives of the Canadian Government. The idea is, that with a sufficient subsidy, there could be created a fleet which would form a splendid second line of defence for the Empire, manned by a proportion of Royal Naval reserve men and with full equipment of guns and ammunition instantly available at the ports on either side of the ocean. In peace time, this

fleet would be used for establishing a fast steamship line for the carrying of mails and passengers between Great Britain and Canada, thus not only keeping itself in excellent trim and running order but performing constant and invaluable service to the Empire.

Montreal, Que.—Plans for a new 1,000,000 bushel elevator to be erected in Montreal, are now in course of preparation. It is believed that the Grand Trunk is back of the project. The elevator will be ready for business in the fall of 1913.

Montreal, Que.—News reached here recently of an accident at Ste. Anne de Bellevue which for the time being completely blocks Ottawa River navigation. A sand-laden barge struck the side of the western entrance to the lock of the canal at Ste .Anne and sank completely blocking the entrance. Capt. J. D. Weir of the Montreal branch of the Marine and Fisheries Department left for Ste. Anne to supervise the work of raising the barge.

Montreal, Que.—The charge of overspeeding while entering the harbor, preferred against the White Star liner Megantic, which is alleged to have done damage to the Monarch through the suction caused by its excessive speed, had to be dismissed when it came up before the Harbor Commissioners, sitting in their judical capacity, as it was shown that they had no jurisdiction within the limits of the harbor over the main ship channel up which the Megantic was proceeding. A similar charge of speeding against the Richelieu & Ontario vessel Saguenay was also dismissed on account of lack of jurisdiction.

Sorel, Que.—The Marine Department has decided on the construction of two steel steam tug boats as the Sorel yards, for use in connection with the dredges now under construction for the St. Lawrence service.

St. Charles River, Que.—The Quebec Transportation and Forwarding Co., launched a steam tug named Margaret A. Hackett, from its plant at the St. Charles River on July 16. She is built of white oak, and is 115 ft. long, 24 ft. wide and 10½ ft. deep.

Lachine, Que.—The Ontario & Quebec Navigation Co.'s SS. Geronia, struck a rock in the Lachine Rapids, on July 13, and was beached near Heron Island. The passengers were removed by the Verdun-La-Tortue ferry steamboat St. Louis, and landed at Montreal. The Sincennes-McNaughton Co.'s tugs Rival and Natalie R. were put to work on the Geronia with the necessary pumps and outfit, with the result that she was floated on July 16, and taken to Montreal for examination and repairs.

Maritime Provinces

Halifax, N. S.—There is a prospect that a shipbuilding plant will be built at the port of Halifax. As a result of cabling by the Board of Trade, the senior partner of one of the largest shipbuilding establishments in England, and a member of an important engineering firm have been here on a tour of inspection and gathering information. The bonus to a plant establishing at this port is $400,000. The men are not after the bonus, but are looking into the matter as a practical business venture, and the outlook is considered most hopeful. The visitors have gone to Sydney, N. S.

Halifax, N.S.—The Halifax steamer Amelia, Capt. O'Hara, owned by the Magdalen Islands Steamship Company, went ashore at the entrance of Clarke's Harbor. The Amelia was on her way from Halifax to St. John via intermediate ports.

Halifax, N.S.—The new turbine express steam yacht Winchester, towed by the English tug Sarah Joliffe, arrived here recently, the latter calling for coal, which will be supplied by the Dominion Coal Company. The Winchester was built at Scotstoun on the Clyde, for P. W. Rouss, New York. The yacht is an oil burner. She afterwards sailed for New York under her own power. Fifteen miles northeast of Cape St. Francis, Nfld., forty-five icebergs were sighted. The Winchester is an entire departure from the conventional type of express steam yacht. She is 205 feet in length, eighteen feet six inches beam, and her contract speed, which her designers believe will be exceeded, is thirty-two knots.

Halifax, N.S.—John McDougald, C.M.G., Commissioner of Customs, was recently in Halifax, making arrangements with regard to the Customs Department. Mr. McDougald has arranged to purchase the schooner "Arthur W." for Customs preventive work in Hudson Bay. The vessel is to be provided with oil engines and will be commanded by Captain John F. Chapman, who will act as preventive officer for the Hudson Bay district. He will leave in August and make his headquarters at Port Burwell, at the entrance to the Bay.

Halifax, N.S.—The Swansea Trader is the name of the recent addition to the Furness Withy line, and which is to be operated in the coastwise trade between Halifax and Charlottetown. This ship is of 550 tons capacity and is solely a cargo carrying vessel. She sailed from Newcastle-on-Tyne on Saturday, July 20, and it is expected she will be ready for her first trip from Halifax on the first Monday of August, continuing a schedule of sailing from here every Monday night. The ports of call will be Canso, Arichat, Port Hastings, Port Hawkesbury, Souris, Charlottetown and Summerside. The return trip, Port Hawkesbury, Arichat and Canso only will be included. The personnel of her crew is not yet made up. The object of Furness Withy Co. in promoting this service is to encourage the import and export trade of those sections of the country served by the ports mentioned; much of the traffic now goes to Montreal. Pickford and Black covered this route for several years by the steamer City of Ghent, but since the withdrawal of that boat, the Furness Withy Co. have felt the necessity of some connection to assist them in obtaining freights for trans-shipment on their trans-Atlantic lines. In connection with the coastwise trade this cannot be said to be an altogether new departure for the Furness Withy line, as they have at present six ships engaged in the Maritime Province coal trade.

St. John, N.B.—The Imperial Drydock Company, of St. John, have accepted the offer of $75,000 from Norton Griffiths Company, Limited, for their franchise and all other rights.

St. John's, Nfld.—The British steamer Manchester Inventor put into port recently, badly damaged as a result of colliding during a dense fog July 24 with a submerged iceberg. The steamer was bound from Montreal to Manchester, England. The iceberg was encountered fifteen miles north of Belle Isle Straits. The vessel's fore compartments were pierced. It was necessary to jettison the deckload of lumber before the vessel could proceed.

Wreck Inquiry.—At the recent investigation into the cause of the stranding of the Magdalen Islands Steamship Co. s.s. Amelia at Boars' Head, in the Bay of Fundy, on June 7, before Capt. W. R. Lugar, Assistant Wreck Commissioner, the captain, W. W. Hersey, was found guilty of negligence, and his certificate suspended for three months. He was given permission to act as mate of a passenger vessel during that time.

St. John, N.B.—The Canadian Pacific Railway Company has awarded a contract to the John S. Metcalf Company, Limited, Montreal and Chicago, for the design and construction of a one-million bushel grain elevator at West St. John, N.B. The elevator will be of reinforced concrete, and will be capable of unloading 160 cars in 10 hours and of shipping to ocean vessels at several different berths. The elevator will be electrically driven, a power plant for the generation of electric power being included in the contract. An extensive shipping gallery system will also be a part

of the work. The elevator is to be ready for the winter shipping season of 1913 to 1914. The approximate cost is $500,000.

Shelburne, N.S.—The new schooner Casarco was successfully launched from the yard of W. C. McKay & Son, recently. She is owned by the Canadian Sardine Co., of St. Andrews, N.B., and is 34 tons register. No prettier little vessel has been seen in our waters for a long time. She is schooner rigged, that part of the work having been done by Frank F. Hunter. Her gasoline engine of 60 h.p. was installed under the superintendence of W. C. Wetemore, of Pictou. As soon as the little craft slid off the ways, her engine was set in motion and she proceeded to the wharf by her own power. Her name, Casarco, is an abbreviation of the three words in the name of the firm. In the forecastle there are ample and comfortable quarters for the crew. The fish tank is large and has capacity for a large fare. In the construction of the vessel the best material has been used and the workmanship is high class. The launch took place at nine o'clock in the morning, and at five o'clock that afternoon, when the men knocked off, the keel of a 140-footer had been laid on the vacant stocks for Lunenburg owners. A good sized vessel for Mr. Payzant of Liverpool is now planked out in the same yard and will be launched shortly.

Great Britain and Ireland

London.—Mr. Sidney Buxton, president of the Board of Trade announced in the House of Commons recently that the Board of Trade has framed new rules governing life-saving precautions on merchant vessels based on recommendations of the committee which had considered the Titanic disaster. The new rules must, said Mr. Buxton, be approved by the House of Commons before their adoption. Mr. Buxton said there would be no time to discuss them or Lord Mersey's report on the Titanic disaster so soon, although many members of the House were anxious for a debate on the subject. The rules, he continued, would be announced during the parliamentary recess and would come up before the House of Commons early next session. He refused to give any inkling as to their nature. Several members of Parliament here assert that the Board of Trade is entirely in the hands of the shipping interests and cannot be expected to act impartially.

London.—The Madrid correspondent of the Pall Mall Gazette says that some letters recently discovered at Palos, Spain, contain interesting information concerning the outlay made by Columbus on his great expedition of the New World. The armanent of the little fleet cost 14,000 pesetas. Columbus and his officers spent about 2,000 pesetas on their personal expenses, and, including the expenses of the crew, 22,050 pesetas was spent for the eight months during which the voyage lasted. The sum total, for which America was discovered, amounted to some 36,000 pesetas, or about $7,000. In spite of the small amount required, however, Queen Isabella was forced to pawn her jewels, it is related, to provide funds for the expedition.

London.—The inquiry into the Titanic disaster cost the Board of Trade about $87,500. This was the estimate made by John McKinnon Robertson, Parliamentary Secretary to the Board, in discussing the report of Lord Mersey in the House of Commons.

Belfast.—The White Star Co. has issued orders that the third steamer of the Olympic and Titanic class, under construction here, shall be provided with a double skin rising well above the water line. This is in accordance with the suggestions in the Mersey report.

London.—Following the report of Lord Mersey on the loss of the steamer Titanic, Sydney Buxton, president of the Board of Trade, has appointed a committee of experts headed by Prof. John Harvard Biles, vice-president of the Institution of Naval Architects, to advise with him in the interest of saving lives at sea. The Daily Telegraph Brussels correspondent says that Holland has decided to convene a Conference of the Powers to elaborate universal rules for making life safe at sea.

New Oil Engine Vessel.—The Toiler, the first oil engine ship to cross the Atlantic, is to be followed by a similar boat, embodying several improvements. The twin-screw machinery will be of the same type, but 50 per cent. greater power; consisting of two sets of two-cycle, four-cylinder Marine-Polar reversible Diesel engines. The auxiliary machinery, including steering gear, windlass, electric light, etc., is to be driven by steam generated by two donkey boilers burning oil fuel. These boilers will also be used for heating the vessel. The dimensions will be approximately the same as the Toiler, namely, 256 ft. length, 42 ft. 6 in. beam, with capacity to carry 2,500 tons dead-weight on a draught of 14 ft. She is specially designed for the grain trade on the Great Lakes of North America and the St. Lawrence.

The New Allan Liners.—The two 17,000-ton Atlantic liners now in course of construction on the Clyde for the Allan Line are to be named the Alsatian and Calgarian respectively.

United States

New York.—The Roosevelt, the steamer on which Rear Admiral Peary sailed into the Arctic seas on his trip to the North Pole, has been sold at auction here. Bids started at $10,000 and jumped by thousands, then by hundreds, the vessel being purchased eventually for $35,200 by H. E. J. McDermott. The vessel was one of six of the wrecking fleet owned by the late John Arbuckle, the Brooklyn coffee man, who is said to have paid about $40,000 for the Roosevelt. Her original cost was more than $100,000, owing to the construction of the hull to meet ice pressure.

Ship Building Work.—A foreign steamship interest which has been negotiating with American yards for several merchant vessels has closed with the Wm. Cramp & Sons Ship & Engine Building Co. for a boat of about 8,000 tons capacity for South American traffic. This company has four additional vessels of similar type now pending. It is believed that the placing of the contract on this side has been induced by probability of boats of American register being granted free tolls through the Panama canal. The Newport News Ship Building & Dry Dock Co. has recently taken several additional contracts of importance.

Detroit.—During a dense fog on Lake Huron, the steamer G. J. Grammer, of Cleveland, was run down and sunk by the Northern Queen. The Grammer went down within a few minutes, in 30 feet of water. The crew was taken off safely in a tug which happened to be in the vicinity. The Grammer is a steel boat, 418 feet long, and was launched at West Superior in 1902. She was down-bound with ore while the Northern Queen was laden with freight destined for Duluth.

San Francisco.—The schooner Casco Immortalas, the ship of adventure, in which twenty-four years ago Robert Louis Stevenson sailed away never to return, soon will be remodelled to enter the fishing business. Stevenson sailed from San Francisco in 1888, cruising through Oceania on the Casco in search of health.

Detroit, Mich.—Two-thirds of the wreck of the sunken steamer Joliet in the St. Clair River, has been destroyed and with favorable weather, the rest of the wreck will be blown to small pieces in the next two or three weeks. The after part of the ship has been broken up. The hull forward of midship is all that remains intact. The hardest part of the work has been accomplished. The boilers proved to be very tough and a number of charges of dynamite were exploded without any effect. The Joliet lies in 39 feet of

water and has settled four to five feet in the gravel. Four tons of dynamite have been used so far.

Duluth, Minn.—During the year which ended yesterday, Duluth and Superior elevators handled 71,913,411 bushels of grain, against a total of 44,263,871 bushels handled the previous year. The increase is largely due to the elevators being used by Canadian grain growers for storing and shipping their grain. With splendid harvests promised on both sides of the boundary line this Fall, there are already indications that the grain received at Duluth and Superior elevators will be even in excess of the quantity handled last year.

Detroit, Mich.—The steamer Mataafa, of the Pittsburg S.S. Company's fleet, and the steamer G. Watson French, of Cleveland, crashed together near the head of the 20-foot channel in Lake St. Clair recently. The Mataafa's hull was bent in and broken for fifty feet on her port side forward of her boilers, and her deck was bulged upward. The French escaped serious damage, although her port bow was stove in above the water line. The cause of the accident cannot be definitely learned. The French, which was bound up with a cargo of soft coal for Fort William, is said to have taken a sheer as she was passing the Mataafa, which was coming down on her way to Lorain with iron ore. After the collision, the Mataafa began to fill. Her crew were unable to keep her clear, and she was almost in a sinking condition when she arrived here. Several women on the Mataafa were badly frightened. The French left last night to resume her trip up the lakes. The French is a steel ship, 356 feet long. The Mataafa was taken to the Detroit Lumber Company's dock, where she will make temporary repairs before proceeding to a Lake Erie port to discharge her cargo and go into dry dock. She also is a steel ship, 430 feet long.

Ashland, Wis.—What is said to be the largest raft of eight-foot pulpwood ever successfully brought across the great lakes arrived here yesterday from Port Arthur. It comprised about 4,000 cords, and is valued at $20,000. The pulpwood was gathered at various places on Black Bay and Thunder Bay, near Port Arthur, and made into a raft at Jarvis Bay. The tugs James Whalen and Laura Grace, in charge of the raft, averaged a speed of one and one-third miles per hour, making the distance of 127 miles across Lake Superior in one hundred hours. It is estimated that the cost of loading vessels with pulpwood at Canadian ports is 75 cents a cord, while the total cost of bringing the raft across the lake was not to exceed 50 cents a cord.

Cleveland, O.—Grain shippers are in the market for tonnage for late loading, and vessel capacity to carry 500,000 bushels from Chicago to Montreal in October, has been tied up. The boats will get six cents a bushel, which is the best rate that has been paid for some time. Shippers are doing some figuring for storage capacity, and local vesselmen were asked to name a rate from the head of Lake Superior to Buffalo for October and November loading. Boat men are in no hurry to charter ahead, as they feel satisfied that the market will be in better condition after this month. Grain men are apparently anxious to cover ahead, as there has been quite a little inquiry. It will probably take some time to get shippers and owners together on rates, as vesselmen are talking 2½ cents on cargoes for late delivery, and three cents for storage. There will be a very heavy movement, and with a large amount of tonnage tied up for ore, the general opinion is that fair rates will be paid on grain when the movement gets started in good shape.

New Haven, Conn.—Charles E. Pickett, clerk of the United States Court here, who is the master in the enquiry into an alleged steamship combination, will sail on August 22nd for Southampton, to take the testimony of J. Bruce Ismay, head of the International Mercantile Marine, on the question of steamship rates. He will be accompanied by two lawyers, representing the United States Government.

Detroit, Mich.—There passed up or down the river during July, 2,963 boats —1,597 during the day and 1,366 during the night.

Washington.—The Lake Carriers' Association has posted the following: —"Submarine bell at Whitefish Point now rings in thick weather. Four strokes 2 seconds apart, silent 6 seconds."

Detroit, Mich.—For the second time this year, all previous records for one month have been broken by the volume of traffic passing through the American and Canadian canals at Sault Ste. Marie. The statistical report for July just issued shows that freight aggregating 10,781,304 short tons was moved through the waterways last month. The record establishes a new high record for traffic through the canals, exceeding by 34,145 tons the record for June this year, which also set a new mark, the best previous record in July, 1911, having been 8,545,819 tons. The principal gain for last month appears in iron ore and lumber, the movement of the former aggregating 7,420,741 short tons, in comparison with 7,378,829 tons in June this year and 5,161,823 tons in July, 1911. The lumber movement was 105,567,000 board feet against 110,168,000 in June this year, and 88,049,000 in July last year. Shipments of soft coal also showed a gain, the total of 2,265,832 short tons comparing with 2,062,375 tons in June and 2,210,309 tons in July last year.

Cleveland, O.—Grain Carriers are in fair demand at Chicago. But wild cargoes in other lines are pretty scarce. A steamer of about 200,000 bushels capacity for prompt loading was placed recently to load at Chicago for Buffalo at 1⅛ cents, and some tonnage for next week is wanted at that figure. Five Cleveland boats with capacity for about 1,250,000 bushels, were chartered at Chicago.

Detroit, Mich.—After a number of attempts to remove her from her watery bed, the schooner Jeanette, of the MacKenzie-Morden Transportation Co., which was wrecked in a dense fog by running on the rocks recently off Dawson's point in Georgian Bay, has been given up as lost. All the cargo was removed.

Detroit, Mich.—July coal shipments from Buffalo amounted to 588,885 tons, as compared with 711,539 tons for the corresponding month last year, while the shipments for June this year were 440,250 tons. Anthracite shipments from Buffalo for this season have been 1,069,385 tons, as compared with 1,907,-832 for the corresponding period for last year.

—⚙—

General

New Grain Line.—As a result of the recent visit of the British manufacturers' delegation to Canada, there is a possibility of the establishment of a new grain line between Canada and Hull to connect with the great milling industries of the north of England. This project was advanced by Mr. Rank, of Rank, Limited, the biggest millers in the British Isles. He stated that he had come out for this express purpose. At the present time the bulk of their Canadian grain is shipped through New York.

The New Allan Liners.—In connection with their two new liners, the Alsatian and Calgarian, which the Allan Line have ordered, it is understood that arrangements of an exceptional nature have been made for perfecting in every way the culinary and catering departments. The company have always been known for their high-class equipment in this direction, and it is interesting to note that they have decided to instal in both new steamers, a galley outfit in pure solid nickel, manufactured by The Berndorf Metal Works.

Canadian Customs.—Tenders addressed to John McDougald, Commissioner of Customs, Ottawa, and endorsed on the envelope "Tender for Customs Steam-

er," will be received up to noon of the second day of September, 1912, for the construction of a Twin Screw Steel Steamer for Customs service on the Atlantic coast, to be delivered at the port of Quebec, of the following leading dimensions, namely:—Length between perpendiculars, 185 feet; breadth, 32 feet; draft, 10 feet 6 inches, and speed 15 knots per hour. Plans and specifications of this steamer can be seen at the Department of Customs, Ottawa, and at the offices of the collectors of customs, Toronto, Collingwood, Montreal, Quebec, St. John, N.B., and Halifax, N.S. Plans and specifications can be procured upon application to the Commissioner, Department of Customs, Ottawa. Each tender must be accompanied by an accepted bank cheque in favor of the Commissioner of Customs, equal to ten per cent. of the whole amount of the tender, which cheque will be forfeited if the successful tenderer declines to enter into a contract with the Department, or fails to complete the steamer. Cheques accompanying unsuccessful tenders will be returned. The Department does not bind itself to accept the lowest or any tender.

Danzig.—The German turbine cruiser Goeben, which was launched at Hamburg in March last year, underwent a speed test recently over a measured mile here, and is reported to have developed a speed of 32 knots. At her previous trial on May 18 she made 30 knots. She is the speediest ship in the German navy.

Canadian Elevators.—A recent report from the department of trade and commerce states that the capacity of the grain elevators in the west for 1911-12 is 89,514,900 bushels, which is an increase of about five millions over the preceding year. In Manitoba the storage capacity is 21,813,800 bushels; in Saskatchewan, 26,465,000; in Alberta, 8,764,500. Ontario milling elevators have a capacity of 1,740,000 bushels; terminal elevators in the same province will accommodate 25,700,400 bushels, while the eastern transfer elevators have a capacity of 20,535,000. The grand total shows 863 stations with a total capacity of 105,466,700 bushels.

Canadian Grain Shipments.—The percentage of shipments from Fort William and Port Arthur terminals to American ports has been steadily increasing during the past four or five years. It is considered that the milling in bond transit privilege given by the States will account to a considerable extent for the increase during the past two years, also the lower freight rates via United States ports to the seaboard which prevailed on occasions during the year. Canadian wheat exports to Great Britain and other countries show a decline from the figures of the previous 12 months.

Antwerp.—It is reported that a company has been formed in Antwerp to work a patent for the construction of ferro-concrete boats. It is proposed to erect works at Ghent, and to begin operations by building several lighters for service in the port of Antwerp.

Panama Canal.—Steam shovel No. 257 working in the west borrow pit of the Gatun dam at Panama excavated 84,519 cu. yds. of material during 26 working days of May or an average of 3,250 cu. yds. of material per day. Of the material excavated, 42,259 cu. yds. were classified as earth and 42,260 cu. yds. were classified as rock. This is the highest record for a month made by any steam shovel on the Isthmus since the beginning of operations.

Victoria, B.C.—The steamer Princess Charlotte, after being cleaned and painted in the Esquimalt drydock, where new propeller blades were fitted, returned to the C.P.R. wharf to re-enter service. She left for Seattle, and the Princess Alice, which has been taking her place, will return to the night run.

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ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals who Have Been More or Less Prominent in the Marine Sphere

Captain George Dick, a well known mariner on the Upper Lakes, died suddenly of heart disease in a Kingston Shipyard on July 25. The deceased officer who was 52 years of age, had been in conversation with his brother some twenty minutes previous to his lifeless body being found.

* * *

Mr. Colin Martin, second officer of the R. & O. steamer Chippewa, was found dead in his bed on board the steamer at Lewiston recently. The deceased seaman, according to his ship's papers, was about 34 years of age, having been born in Campbelltown, Scotland.

* * *

Mr. L. J. Paineau, Montreal, has been appointed inspecting engineer to supervise the work of private companies in navigable water, and see that plans which the Government approves are carried out. There has been complaint that these plans are in many cases departed from, for the benefit of private parties, and often to the detriment of the public.

* * *

Turbine-Yacht "Winchester."— The turbine-yacht Winchester, built for Mr. P. W. Rouss, New York, by Messrs. Yarrow & Co., Glasgow, under the supervision of Messrs Cox & Stevens, naval architects, New York, ran her full-speed trials on the Skelmorlie, Forth of Clyde, deep-water measured mile on June 25, attaining a mean speed of 32¼ knots. This was a quarter of a knot in excess of the contract speed. The Winchester is 205 ft. in length by 18 ft. 6 in. in breadth, and the trials prove her to be one of the fastest yachts afloat. The propelling machinery consists of Parsons turbines driving two shafts, and steam is supplied by two Yarrow water-tube boilers fired with oil fuel.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont., Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street ,Kingston, Ont.; Captain T. J. Murphy, 111 William St., Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy St., Kingston, Ont.; Captain James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rideau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

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Jno. A. Murphy, Midland, Ont., Grand Conductor.
George Bourret, Sorel, P. Q., Grand Doorkeeper.
Richard McLaren, Owen Sound, Ont.
L. B. Cronk, Windsor, Ont.
Grand Auditors.

Mr. William B. Smith, managing director of the Dominion Transport Company, recently celebrated his 83rd birthday, and hosts of friends congratulated "Uncle William," as he is known to his intimates, on the vigor with which he bears his years. Mr. Smith has long been a prominent figure in Montreal, as a representative of an older generation of Scotchmen, which includes Lord Strathcona and Lord Mount Stephen. In fact, Mr. Smith was born within a few miles of these two at Huntly, Aberdeenshire, in 1829. He came to Canada in 1855 as a young man of 26, and settled at Woodstock, Ont., where he entered the employ of the late John Shedden, founder of the Shedden Forwarding Co. At that time, transportation was pretty much in its infancy, the railway locomotives mostly burning wood. In the early '80's, when the Canadian Pacific was organized, Mr. Smith formed the Dominion Transport Company, and came to Montreal to take charge of its work, having lived there ever since. He started in a very modest way, but as the C.P.R. grew in importance, the Dominion Transport kept pace, until to-day it is one of the leading business enterprises of the metropolis. Despite his many years of work, "Uncle William" is still the guiding spirit of the company, and is to be found every day at his office in close touch with the work.

* * *

Mr. John D. Beatty, general manager of the North-west Transportation Co., previous to its being merged in the Northern Navigation Co., in 1902, died at Sarnia, Ont., where he had resided for over 40 years, on Sunday, July 14.

* * *

First Allan Liner—There is being shown in the Allan Line offices a model of the first Allan Line vessel Jean, built at Irvine in 1819 for the founder of the line, Alexander Allan. The Jean was a brigantine, 76 ft. in length and of 169 tons.

Directory of Subordinate Councils for 1912.

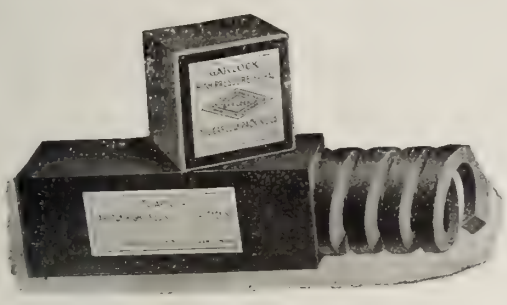
Name.	No.	President.	Address.	Secretary.	Address.
[illegible]	1	A. J. Fisher,	490 Concord Ave.	E. A. Prince,	61 Elm Grove, Toronto.
St. John.	2	J. F. Matthews,	50 Douglas Ave.,	G. T. G. Blewett,	65 Harrison St., St. John, N.B.
[illegible]	3	Andrew Kerr,	Box 343, Collingwood,	Robert McQuade,	P.O. Box 97, Collingwood,
[illegible]	4	A. E. Kennedy,	395 Johnston Street,	James Gillie,	101 Clergy St., Kingston, Ont.
[illegible]	5	A. F. Hamelin,	3208 Le Tang Street,	O. L. Marchand,	St. Vincent de Paul, P.Q.
[illegible]	6	Alex. McNevern,	P. O. Box 234,	Peter Gordon,	808 Blanchard St., Victoria, B.C.
[illegible]	7	A. S. DeGruchy,	Room 23, Williams Bldg.,	E. Read,	859 Thurlow St.
[illegible]	8	Helaire Mercier,	Bienville, Levis,	Jules Lecours,	Bienville, Levis, P.Q.
[illegible]	9	Geo. Bourret,	Sorel, P.Q.,	Al. Charbonneau,	P.O. Box 132, Sorel, P.Q.
[illegible]	10	H. W. Fletcher,	636 4th Ave. East,	E. J. Riley,	1030 1st Ave., Owen Sound, Ont.
[illegible]	11	Alex. McDonald,	Windsor, Ont.,	Neil Maitland,	221 London St. W., Windsor, Ont.
[illegible]	12	Jos. Silverthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
[illegible]	13	D. J. Murray,	Victoria Rd., Dartmouth,	Chas. E. Pearce,	Portland Street, Dartmouth, N.S.
[illegible]	14	[illegible] O'Reilly,	Sault Ste Marie,	Geo. S. Biggar,	Sault Ste Marie, Ont.
[illegible]	15	J. K. Sutherland,	Charlottetown, P.E.I.,	Lem Winchester,	302 Fitzroy St., Charlottet'n, P.E.I.

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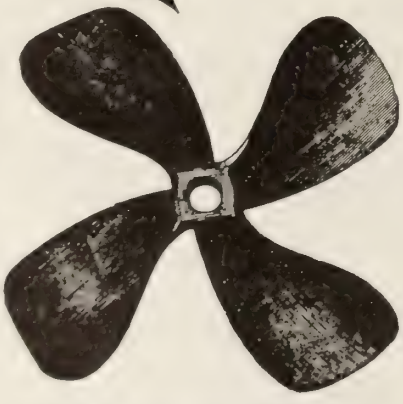
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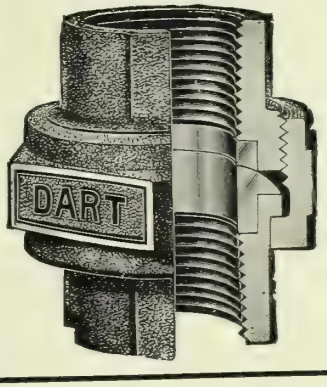
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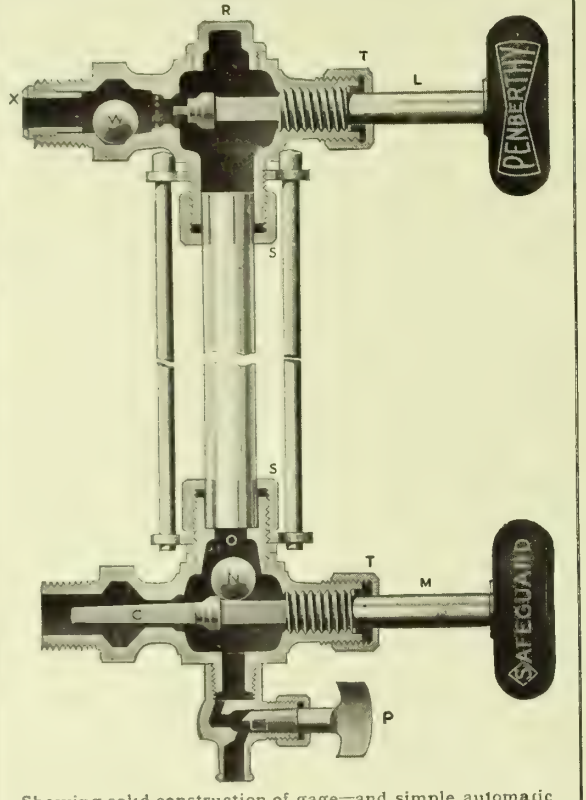
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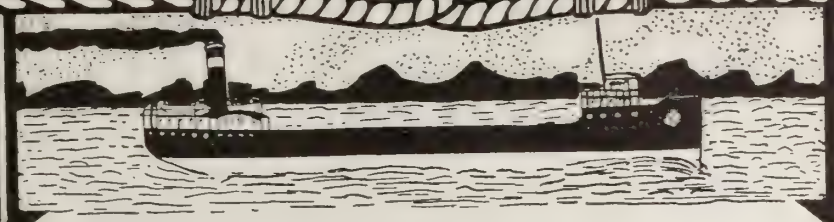
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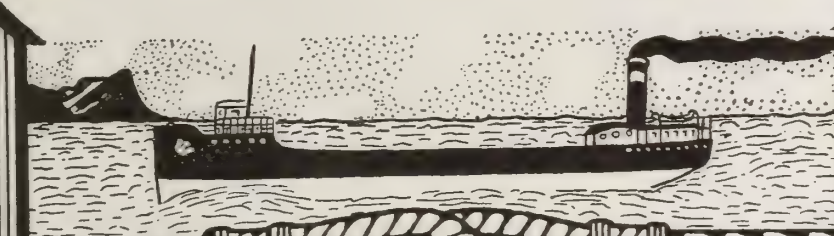
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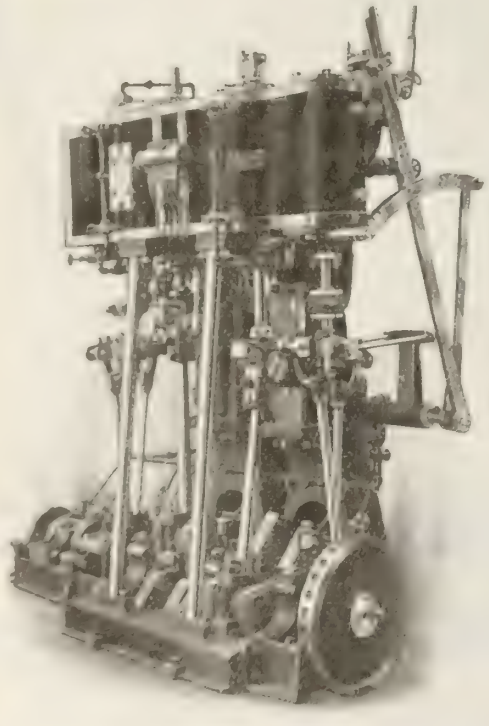
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Great Britain's Part in Building Canadian Steam Ships

Being the sixth of a series of short illustrated articles descriptive of steamships recently built and presently building in Great Britain and Ireland for the Canadian merchant and passenger trade. From the details given, it will be seen that the latest fully proved developments in shipbuilding and marine engineering are being adopted by those responsible for the steamship service to and from and within the Dominion.

C. P. R. LINER "EMPRESS OF RUSSIA."

THE Fairfield Shipbuilding & Engineering Co., Ltd., launched on Aug. 28, the Empress of Russia, the first of two large turbine-driven steamers they are building to the order of the Canadian Pacific Railway Co., for their passenger and cargo service between Canada, Japan, and China.

General Data.

The new vessels will be the largest upon the Pacific route. They are 590 feet in length, 68 feet in breadth, and 46 feet in depth, with a gross tonnage of about 15.000. They have double bottoms, orlop, lower, main, upper and shelter decks. Above the shelter deck there is a long combined forecastle and bridge, the bridge deck being extended; to the stern on side stanchions. Above the bridge deck there is a promenade deck about 350 feet long, on which will be the principal first-class public rooms, with the officers' quarters and navigating bridge over. The hulls are subdivided by numerous closely-spaced watertight bulkheads, and in addition. a full complement of lifeboats and lifebelts will be carried. The vessels will be classed at Lloyd's, with freeboard restricted to conform to the bulkhead spacing. Each of them will have accommodation for 200 first-class, 100 second-class Asiatic, and 800 third-class Asiatic passengers.

On the starboard side aft of 'midship, staterooms for four persons have been fitted up for second-class passengers, and forward of these on the same side are a number of rooms for first-class passengers. On the shelter deck just forward of 'midship, are situated the first-class reception-room and cafe. Immediately forward on this deck are large staterooms for two and three persons. Adjoining the cafe on the aft side is the main saloon, which is lit from the sides by a number of beautifully designed windows and from above by a large well. The tables are arranged to suit the demands of various passengers, from small tables for two and four persons to semi-private tables for six, arranged in alcoves. There will be larger tables for larger parties.

Within easy reach of the cabins on the upper deck, leading direct to a covered promenade on the shelter deck. is the entrance and lounge for second-class passengers, and this in turn leads to the second-class saloon. At the aft end of the shelter deck, isolated from the first and second class, there is a large covered airing space for Asiatic steerage. The hospitals, laundry, embalming room, etc., are at the extreme aft end of the ship on the shelter-deck. Ascending the grand staircase from the reception-room, the first-class staterooms on the bridge deck are reached. They are enclosed in a complete steel deckhouse, 340 feet long, and each room measures 10 feet by 9 feet., with sleeping berths for two persons and a couch so arranged as to be easily converted into a bed should it be found necessary.



C.P.R. LINER "EMPRESS OF RUSSIA," AS SHE WILL APPEAR WHEN IN SERVICE

The new liner has a handsome writing-room, smoking-room, and verandah cafe, and a large gymnasium fitted up with a variety of exercising machines.

Machinery Equipment.

The propelling machinery will consist of four turbines of the Parsons type, embodying the most recent improvements in design and construction to ensure the maximum economy of fuel consumption. The port wing shaft will be driven by an H. P. turbine, which will exhaust into an L.P. turbine driving the starboard wing shaft. The two inner shafts are each driven by an L.P. turbine, which has a powerful astern turbine incorporated in the same casing. The introduction of an I.P. turbine will provide a much wider range for the expansion of the steam, and will effect a marked improvement in steam consumption as compared with the usual arrangement of turbines driving either three or four shafts hitherto, adopted in large mail steamers.

For manoeuvring when entering or leaving harbors, independent high-pressure steam connections are provided on each L.P. ahead turbine. An independent high-pressure steam connection has also been provided on the L.P. turbine, which, combined with a suitable arrangement of valves, enables the H.P. turbine to be cut out; or should the L.P. turbine be out of action. the H.P. turbine can exhaust direct into one or other or both of the L.P. turbines.

The four turbines are situated in one watertight section, and in a separate compartment immediately aft, the two condensers are placed, together with the circulating pumps, Dual type wet and dry air-pumps, evaporators and distillers. The circulating pumps and air-pumps form two distinct and separate sets, each set working in conjunction with one condenser, and independent of the other, but are also arranged with suitable cross connections so that either set of pumps can, in case of emergency, work in conjunction with both condensers.

The installation of auxiliary machinery is exceptionally large, and, as in the case of the turbine installation, has been designed with a view to securing the greatest economy in fuel consumption and convenience in working.

The feed water system for the boilers comprises two twin filters of the gravitation type, through which the water from the air-pumps is discharged on its way to the hotwell tanks. Two hotwell pumps discharge the feed water, first through a surface feed water heater and afterwards through a contact feed heater, from which the four feed pumps take their supply and discharge direct to the boilers. The feed water is heated by the exhaust steam from the auxiliary machinery throughout the ship, the steam from ship's heating systems and drainage systems from steam pipes, etc. The system evolved is the result of careful consideration, and will ensure that all waste heat from the auxiliary steam and exhaust systems are utilized in heating the feed water instead of the heat being carried away by the circulating water from the condensers.

For harbour use, a separate auxiliary condenser with circulating pump, air-pump, feed filter and feed pump is fitted to admit of the corresponding auxiliary machinery used on service being opened out for cleaning and examination as necessary. All the bearings for the turbine and line shafting are connected to the forced lubrication system, and the oil supply is maintained by four large oil pumps which discharge the oil through special coolers before entering the bearings. Separate pumps are fitted for circulating cold sea-water through the oil coolers. Drain tanks, into which the oil gravitates from the bearings and settling tanks for separating any water or impurities from the oil, are fitted in the condensing room.

The pumps for ship's service consist of two general service pumps, three sanitary hot and cold water pumps, two bilge pumps, two fresh-water pumps, and a ballast pump.



C.P.R. LINER "EMPRESS OF RUSSIA" TAKING THE WATER.



C.P.R. LINER "EMPRESS OF RUSSIA" ON THE WAYS.

Refrigerating Machinery.

The refrigerating machinery and electric machinery are situated in a separate compartment aft of the condenser room. In view of the service in which these vessels are to be engaged, the installation of refrigerating machinery fitted is very large, and comprises two machines supplied by The Liverpool Refrigeration Co., Ltd., for the preservation of perishable provisions for ship's use. A series of insulated chambers for meat, fish, poultry, game, dairy produce, fruits, will be fitted, having separate compartments for vegetables, ice, etc., each of which can be refrigerated to the desired degree of temperature. These chambers are placed in the lower 'tween decks amidships, and in addition there are a number of cold larders, bar refrigerators, and water coolers in various parts of the ship for the use and convenience of the stewards' department, and for the providing of iced drinks for the passengers. All these are refrigerated direct by the machines, and are under easy control.

An ice-making plant is also provided for making ice on board for the ship's use. The machinery is in duplicate throughout, and is on the Liverpool Refrigeration Company's well-known carbonic-anhydride system. Each machine includes a steam-driven CO2 compressor mounted on a heavy tank base in which are the gas condenser coils, which are of solid drawn copper tube, especially made to withstand the high working pressure. The evaporators and brine pumps are placed in an insulated house partitioned off from the machinery space. In this house are also placed all the cold parts of the machinery, such as valves, headers, etc., where they are efficiently protected from outside heat, while being perfectly accessible. Either machine is capable of doing the whole of the work required, the other being a stand-by. Generally, the whole installation embodies the very latest practice, and has a number of special features which add to the ease and certainty of working.

Boiler Equipment.

Steam is generated in six large double-ended boilers and four single-ended boilers, situated in three separate compartments, and working under the Howden system of forced draught, the air supply being maintained by an installation of electrically driven fans fitted in duplicate and situated on the main deck. Throughout the whole of the sixty-four furnaces, the "Regulator" patent furnace bridge has been fitted by the Regulator Furnace Bridge Co., Ltd., of Derby-road, Bootle, Liverpool. Two pole masts and three large and well-proportioned elliptical funnels, one for each boiler compartment, give the vessel a strikingly handsome appearance.

For dealing with the ashes at sea, See's ash ejectors are fitted in each stoke-hold, and in each boiler compartment a specially designed ash ejector pump for supplying the water under pressure to the ejectors is fitted. Steam ash hoists of a silent type are also fitted in each boiler compartment for harbor service. The ash hoisting arrangements have received special consideration in order to minimise the noise which is so objectionable, and this machinery has therefore been removed entirely from the vicinity of the passenger quarters. The Willett-Bruce automatic steamship whistle control has been supplied to the vessel.

Miscellaneous.

The outstanding feature of these vessels will be the size, design and quality of the public rooms, parlor suites, special and ordinary state rooms, also the large proportions of the second class and Asiatic accommodation. The public rooms in the one ship will be of "English" design, and the other of "French" design. Among the other special features worth mentioning are the various methods of heating and ventilating the ships. Each first class room or public room can be heated and ventilated on the thermo-tank principle, as can also the second and steerage accommodation, about 20 of these tanks being distributed throughout the length of the vessel. Natural ventilation has also been provided in various sections. Electric radiators and electric fans can also be used in the state or public rooms should the conditions so demand.

The sanitary accommodation is of the most improved description, each group of lavatories being fitted with an ample number of baths, showers, washbasins, etc., supplied with hot and cold sea and fresh water, the fresh water passing through specially designed filters. A powerful electric suction fan in each section will keep the lavatories fresh.

The electric generating plant, consisting of five independent sets of engines and dynamos, provides a complete system of electric lights, radiators and power for the large stokehold fans, also for the ventilating fans throughout the ship, and for the silent working cranes and winches for rapid handling of cargo. Signalling at sea can be carried on by a semaphore on the bridge, of the type used in the British Admiralty for short distances, while her equipment includes, of course, the long range Marconi system.

—⚙—

ELECTRIC PROPULSION OF SHIPS.

AN important experiment on ship propulsion is being carried out in the United States Navy, with three ships each of 20,000 tons displacement and of about 5,600 h. p. and 14 knots, of collier type, intended to carry 12,000 tons of cargo. The Cyclops is operated by two triple expansion reciprocating engines. The Neptune is provided with two turbines connected to the propellers by mechanical gearing, and the Jupiter is now being equipped with a turbo-alternator and two induction motors. Considerable interest attaches to the Jupiter, as it is regarded as the first example of electric ship propulsion upon a large scale.

Equipment of the "Jupiter."

The generator is a six-stage Curtis turbine connected to a bipolar alternator, the speed of which at 14 knots is about 2,000 r.p.m., working at approximately 2,200 volts. From details given in the Electrical World it appears that the two motors are mounted directly upon the propeller shafts, one to each shaft. Each motor has 36 poles, and at 14 knots they operate the propellers at 110 r.p.m. Two water-cooled resistances are placed in circuit with the rotors during reversals, and for this purpose there are sliders on the motor shafts, worked by levers attached to the motor frames. The generators and the motors are self-lubricating and self-ventilating, and the switchboard is provided with oil switches and the necessary power-recording apparatus.

When the installation is complete, sheet metal ducts will be connected to air outlets in such a manner that the heated air will be conveyed to the suction of the boiler-room blowers so as to keep the engine-room cool. Interlocks have been provided to prevent wrong connections from being made, and to prevent the go-ahead switch and the reversing switch from being closed at the same time. Magnetic locks check the movement of the levers until the generator has lost its magnetism, and they thus prevent the burning of contacts through incorrect movements.

It is intended that the speed of the motors shall be changed by varying the speed of the generator, the ratio of speed reduction remaining fixed. The turbine is provided with a special governor which automatically keeps the speed at any value from about five knots up to the maximum. It is arranged that the operating engineer shall be able to run the vessel at any desired speed, ahead or astern, stop or start, all from one position, and his instruments will record the power delivered to each propeller. The apparatus was recently set up in the shops for a test, in the same manner in which it will be installed in the Jupiter, and the effects of speed, voltage, vacuum, and superheat were all investigated.

It is said that new developments of the turbine have been made which would lead to considerable improvements upon the results obtained in this manner.

The Montreal Floating Ship Dock, "Duke of Connaught"

By C. T. R.

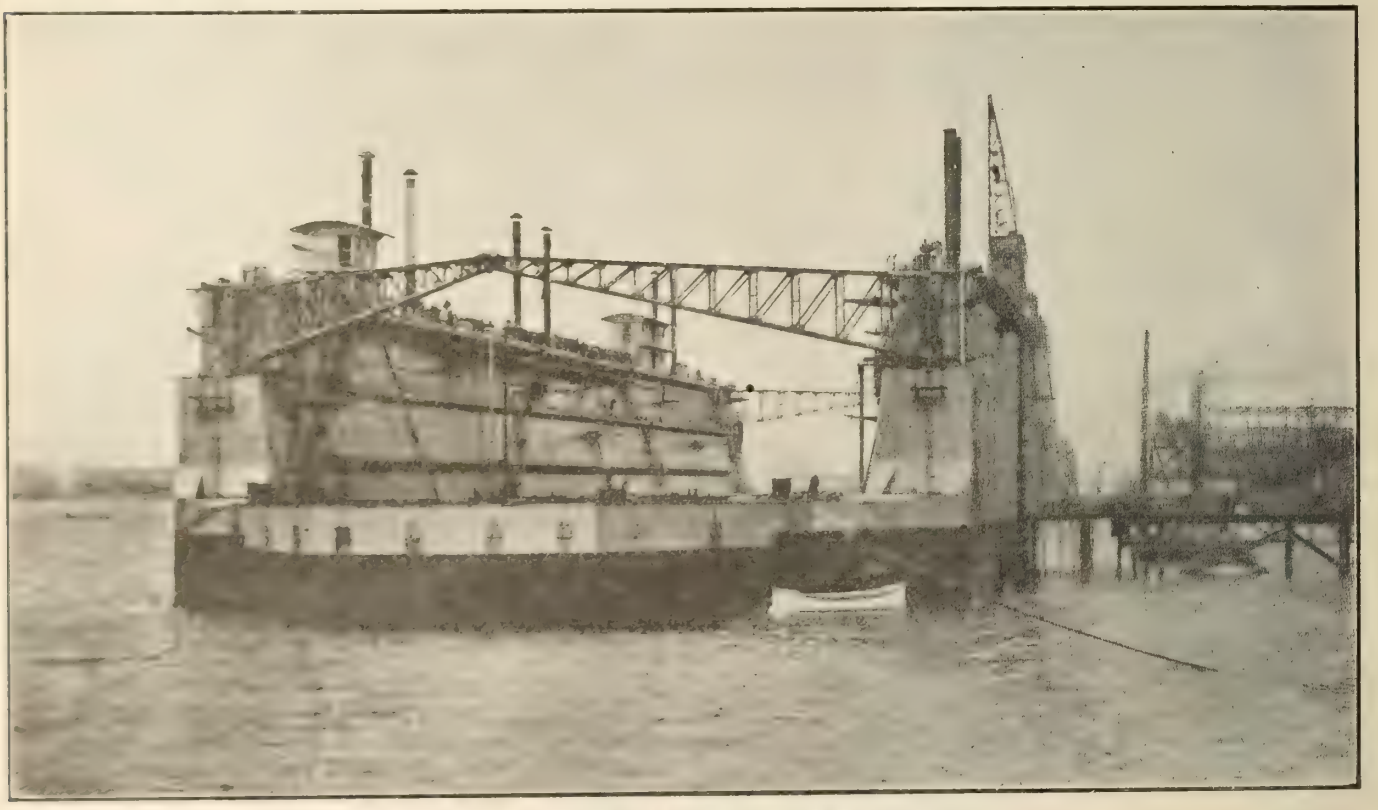
In our August issue, a rather complete account was given of the launch and social features, therewith connected, of this latest development in Canadian shipbuilding and marine engineering enterprise, and as a supplement to what has already been written, there is now detailed much interesting data, relative to the construction and equipment of the dock.

THE floating drydock built by Vickers Ltd., for their shipyard plant at Montreal, is capable of docking the largest existing vessel in the British Navy. It is of the double-sided self-docking type, on the principle known as the "bolted sectional." It consists of a pontoon or lifting portion of the dock, and two parallel side walls, built on to and forming part of same; the whole length being divided into three complete and separate sections, which, when bolted together, form the complete dock. These sections are so arranged that when the dock is separated into its three parts, any two of them can dock the remaining third between them. For this purpose, each section is fitted with its own independent pumping machinery, so that it can also act as an independent unit

Pontoon Construction Detail.

The construction is such as to make it suitable for lifting a modern British battleship, the pontoon deck being specially stiffened to allow it to support a large portion of the weight of the vessel on sides or bilge, as well as central keels. The pontoon consists of a rectangular structure plated in all round with the exception of the portion of the deck which comes directly under the walls, and stiffened internally by longitudinal and transverse girders. It is divided into three sections by joint chambers. The two end sections have their outer extremities built in the form of a point or bow, terminating in a working platform carried on plate and braced girders. The bottom plating, except under the walls, is arranged to run transversely, and is connected to the plating of the sides and points by chine angles; the top or deck plating, similarly arranged, is connected to the face of the side wall by chine angles. The pontoon is divided into four compartments by three longitudinal intercostal watertight plate-bulkheads. Transversely, the pontoon is divided into 54 bays, 20 in the central section and 17 in each end section, by transverse girders, consisting of plate-bulkheads. In the compartments under the walls the plate-girders are replaced by special lattice-girders.

In addition to the bulkheads, the deck and bottom platings are stiffened by means of a series of longitudinal frames which run fore and aft over the length of the pontoon, intercostal between the transverse girders. In addition to the transverse lattice-girder under the wall, intermediate transverse ordinary frames are fitted 2 ft. 6 in. apart, and are prolonged upwards, forming the ordinary frames of the walls. The central bulkhead between the transverse girders is stiffened by vertical "breathing" plates, which are well stiffened and connected to a longitudinal curtain-plate. Outside this framing of breathing plates and longitudinal curtain-plate, the pontoon deck and bottom are stiffened by longitudinal framings consisting of angles, connected to the transverse bulkhead stiffeners by gussets and diagonals. These framings extend to the line of the face of the wall. In the centre section, several of these frames are provided with plates riveted to them, to take the load from the side keel-blocks. The intermediate longitudinal bulkheads are formed of vertical plates, intercostal between the transverse girders, to which they are



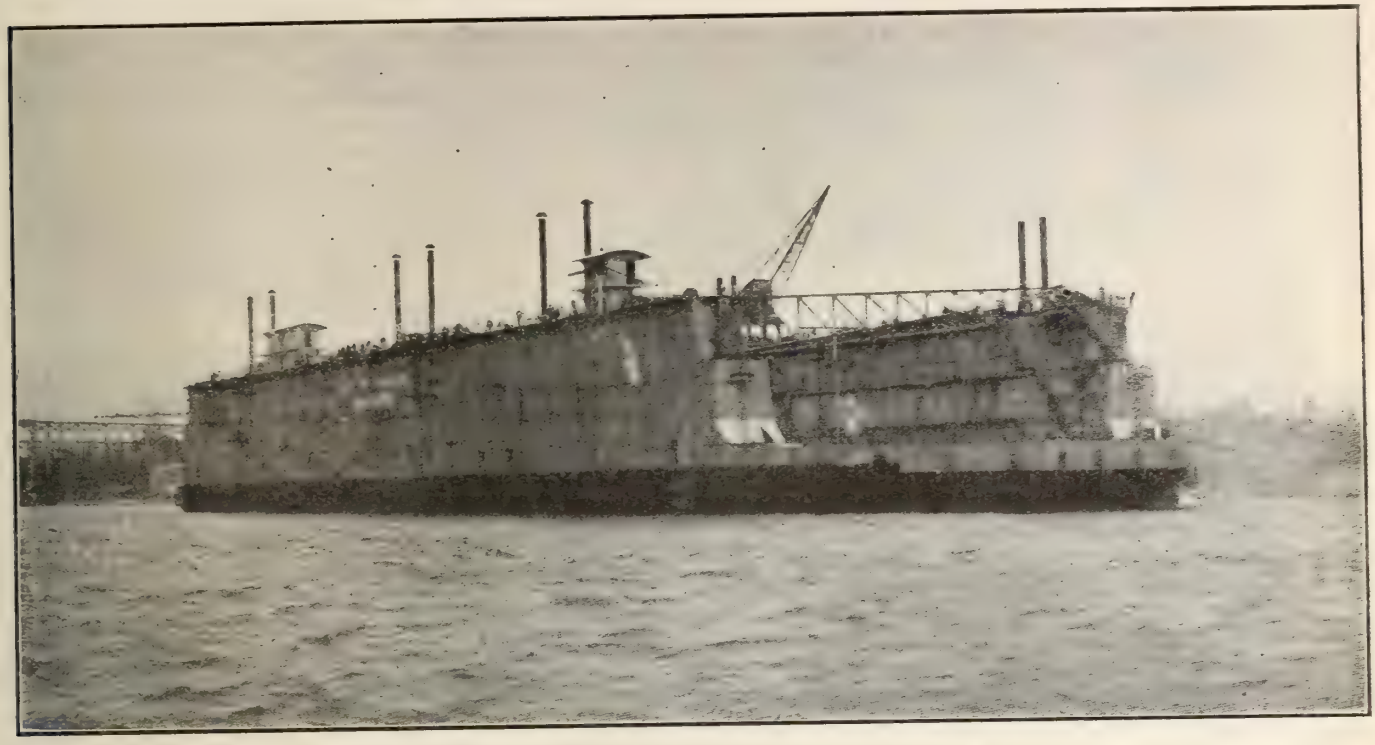
MONTREAL FLOATING DRYDOCK, "DUKE OF CONNAUGHT."

attached, as they are also to the top and bottom plating. To facilitate the complete withdrawal of all water in the pontoon, shallow troughs are fitted, which form a gutter.

Dock Walls.

The walls of the dock are plated horizontally and have a batter on the face or inside wall. The top deck of the walls is plated longitudinally, and is connected to the side plating by double chine angles. An engine deck, on which is placed all the machinery of the dock, is fitted about 16 ft. below the top deck, and is arranged water-tight. Each wall is divided, in addition to the joint chambers, into ten water-tight divisions by plate bulkheads, coming in line with the bulkheads in the pontoon, of which they are a continuation. At each end of the wall, a docking land is formed, on which the central portion can rest when being self-docked. The framing of the walls is of two types, braced and ordinary. In line with the transverse girders of the pontoons, of which they form a continuation, the frames consist of single angles stiffened by vertical web-plates, the front and back frames being cross-connected by a series of diagonals and gussets. The ordinary frames of the walls consist of single angles back and front, cross-connected by a series of horizontal struts.

Special stiffening is fitted in way of the machinery. About 1 ft. below the top deck, a running deck is provided for enabling ropes to be easily handled and run from one end of the dock to the other outside the stanchions. Timber-heads and such fittings required in berthing vessels are fitted on this deck. At a distance of about 15 ft. and 29 ft. respectively below the running deck, two further stages, known respectively as painting and shoring stages, are provided.



MONTREAL FLOATING DRYDOCK, "DUKE OF CONNAUGHT."

Dimensions of Dock.

The general dimensions of the dock are as follow:—

	Ft.	In.
Length over platforms	600	0
Length over pontoons	550	6
Width over all	135	0
Depth of pontoon at centre..	17	0
Length of side walls	470	6
Height of side walls above pontoon deck	42	0
Width of side wall at base...	17	6
Width of side wall at top ...	12	6
Clear width between roller fenders	100	0
Draught of vessel	27	6
Lifting capacity .....25,000 tons		

Dock Sections.

Each end of the central section and each square end of the terminal sections is provided with a joint chamber, by means of which the sections can be joined together or parted. For the purpose of dealing with commercial vessels, which ordinarily will not have the weight or dimensions of the Dreadnought, the dock has been designed so that it can work when required in two independent units of unequal size, and to facilitate the rapid connection of the two portions, cast-steel rocking joints, in the form of knuckles, are fitted at the level of the keel-blocks.

The pumping installation of the dock is driven by steam generated in boilers carried on the dock itself. Each section of the dock has its own complete pumping installation, and each installation consists of two boilers and two engines and pumps installed in specially constructed chambers on one of the walls. The pumps, which are of the centrifugal type, 17 in. diameter, are seated on a main drain at the bottom of the dock, which is continued over practically the whole length of each section. From the main-drain compartment pipes are led to each separate water-tight division of the dock. Each compartment is governed by its own separate valve, and the main inlet pipe and pump discharge pipe are governed by separate screw-down valves, and in addition have each a non-return flap-valve on the outside.

The compartment valves of each section of the dock are operated from a valve-house placed on the top deck of each section, by means of the Westinghouse electro-pneumatic system, which is based on the principle of operating presses by compressed air and controlling the same from a distance by means of valves operated by an electro-magnet. Each valve-house is in telephonic communication with its respective engine-room and also with the others when the dock is working as a single unit.

Fire Service And Steam Heating.

Each section of the dock is also provided with a direct-acting steam-pump, arranged to draw from the sea, and capable of providing a full stream of water for fire service or washing down vessels. These pumps are also connected to the main drain, so that they may be used as a drainage service for completely emptying the compartments. Two similar steam-pumps are also fitted on the opposite wall of the dock. Steam heating is provided to prevent water in the compartments from freezing, and also for the mechanism that would be affected by frost. Each water-tight compartment is provided with the Gardner and Ferguson indicating system, to show, in the valve-house, the level of the water inside it. Similar gear is also provided for indicating the draught of water over the keel-blocks.

Operating Equipment.

The dock is provided with eight steam capstans, four on each wall. The spindles of the capstans are carried down vertically to the level of the pontoon deck, where, in a small chamber in the wall at this level, cable-lifters are fitted, so that the mooring cables may be hauled in or paid out when the dock is being moved about. Donkey boilers are provided on the wall remote from that in which the main boilers are fitted, to provide steam for the capstans and fire-pumps fitted on that wall. On the top deck of this wall, a 3-ton electric traveling gantry crane is fitted and arranged to traverse the whole length of the wall. At both ends of the combined dock a pair of flying gangways or swinging bridges are fitted, affording access from one wall to the other.

The dock is lighted throughout the machinery compartments by means of electric lamps. The outside lighting consists of bracket standards, each supporting a cluster of lamps. Box terminals are also fitted on the walls, from which lamp clusters can be taken by flexible leads for lighting any particular portion of the ship on the dock. Electric current will be supplied through cables from the shore. The usual bollards and timber heads are provided. Roller fenders are also fitted to protect the walls of the dock from an entering steamer. Eight mechanical side shores, four on each wall are installed. These can be screwed in or out by a standard fitted on the top deck. Keel-blocks, side or docking keel-blocks, and bilge-blocks are provided; the latter being arranged to be pulled in or out to suit the shape of the ship when she has taken the keel-blocks. The keel-blocks are strongly made and closely spaced, to enable them to take the weight of the heaviest and most modern ironclads. Ladders are fitted leading from the upper deck of the dock to the pontoon-deck, and also into the various compartments of the dock. Suitable hand-rails are fitted all round the top deck.

Ventilation by means of cowls and downcast pipes is arranged to each boiler and engine-room, and also to the interior of the walls. A valve-house large enough to contain the valve-control table and the recording instruments is fitted on the top deck of each of the three sections; each valve-house contains the apparatus necessary for controlling the valves of its own particular section.

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DRYDOCK CONSTRUCTION IN CANADA.

SOME important additions to the dry-dock accommodation of Canadian ocean and lake ports are now in progress, partly as a result of the increased number of steamers now using these ports and partly as a result of the dry-dock Subsidies Act of 1910. At the time the Act was passed there were only five modern dry docks in the Dominion. Two of these are on the Atlantic coast—one at Halifax and the other at Quebec; the third is at Esquimalt, British Columbia; and two are at the Ontario lake ports of Kingston and Collingwood. The largest of the older lake-port docks is at Collingwood, on the Georgian Bay, which has for nearly 10 years been the most important centre of the steel shipbuilding industry in Canada. This Collingwood dock, which is 425 feet long and 105 feet wide, was in existence some years before the Subsidies Act of 1910 was passed; and since that Act went into operation, a second and longer dock—525 feet long and 78 feet wide—has been constructed at Collingwood, where to-day any of the Canadian vessels now on the Great Lakes can be handled. The dock at Kingston is 315 feet long and 62 feet wide, and as yet this dock and the two at Collingwood are the only large dry docks on the Canadian shores of the Great Lakes.

The only large dry docks on the Atlantic coast are still those at Halifax and Quebec. At Halifax there is 30 feet of water on the dock sill. The dock has an entrance width of 89 feet and is 585 feet long. The Quebec dock has an entrance width of 62 feet and is 600 feet long. It is, however, quite inadequate for the accommodation of 20 or 25 of the larger steamers now in the St. Lawrence trade, and to meet these conditions on the St. Lawrence a large floating dry dock is building for Montreal, and the Department of Marine and Fisheries is at work on plans for a large dock to be constructed either at Quebec or at Levis.

Work at the Lake Ports.

So far, since the Act of 1910 authorized the payment of subsidies to dry dock companies, most progress with new docks has been made at lake ports. At Port Arthur, at the head of navigation on Lake Superior, the largest dock on the Canadian shores of the lakes is now nearing completion. It is 880 feet long and 75 feet wide, and forms part of the equipment of the yard of the Western Shipbuilding Co.; largely an American undertaking, in which about a million and a quarter dollars are being embarked. Work is to be begun this summer on a dry dock and shipbuilding yard at Sault Ste. Marie, Ontario; a Government subsidy has been granted to a dock at Owen Sound, Ontario; and at the Polson yard at Toronto, a floating dock is being constructed, which, when completed according to plan, will be 600 feet long, 100 feet wide, and will have a lifting capacity of 9,000 tons. This dock is being built in two sections. The section on which work is now proceeding is 336 feet long, and is to have a lifting capacity of 4,500 tons.

At Esquimalt, on the Pacific coast, where the only large steel shipbuilding yard on tide water in Canada is now being equipped, a dock 900 feet long, 128 feet wide, and 41 feet deep, is being built. A little over two and a half million dollars is being spent on the establishment of the yard and the construction of the dock at Esquimalt. A scheme is on foot for a large dry dock at St. John, New Brunswick, and a company has also been organized for building a dock at Sydney, Cape Breton.

Aid was given by special act to the docks at Halifax, Quebec, Kingston, and Collingwood. Under the general law of 1910, the Government can grant a subsidy of 3 per cent. on the capital outlay on any dry dock undertaking whose promoters comply with the conditions imposed by the Department of Marine and Fisheries, which supervises the working of the Act.

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IF TALK WERE MONEY.

"What the British Empire needs is More Talk," and the Rt. Hon. R. L. Borden ably and eloquently proceeds to meet that need. If talk were money, Canada has provided enough speeches to build all the Armadas in history; but of "the stuff that is more precious than talk" Canada has not given enough to build a rowboat. Mr. Borden's speeches were fine, but there has been a superfluity of speeches on the subject of Canada's share in the defence of maritime freedom. The time has come for Canada to either close her lips or open the cash box."—Toronto Telegram.

COLLAPSIBLE BOATS.

ONE result of the loss of the "Titanic" may be that every vessel will be compelled to carry a sufficient number of boats to take off all the passengers and crew should the necessity arise, and in many cases it will be difficult to find accommodation for the number of boats required. To save space, recourse will have to be had to rafts and to collapsible boats, and there appears to be no reason why, for all practical purposes, such craft should not be as serviceable as the rigid type.

The "Oxford."

Considerable advances have been made during recent years in designing collapsible boats. For instance the frames have been strengthened, the canvas protected, and the boat can be quickly gear-

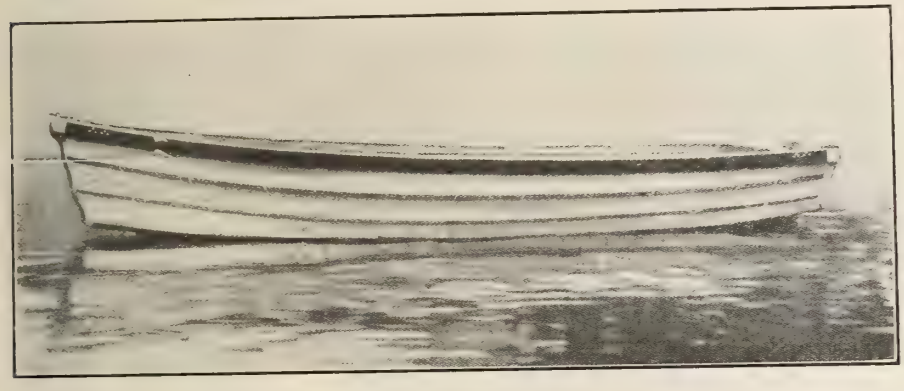


FIG. 1. THE OXFORD COLLAPSIBLE BOAT

ed and made ready for use and loaded with passengers when slung from davits for lowering. A boat in which these improvements are embodied is known as the "Oxford," the builders being Messrs. Salter Bros., the well-known Oxford firm, whose experience in designing and constructing launches and similar craft it would be difficult to equal. Their "Oxford" collapsible boat is built with a double skin of oak at the bottom, so that the canvas is thoroughly protected in beaching the boat. It folds together so that one "Oxford" boat can be carried under each of the usual boats, or, if necessary, four or more can be stacked under one pair of davits, and in either case will take no more deck room than one ship's boat. When lifted by the davits it is automatically distended and can be launched as fast as lifted. The boat can also be distended while lying flat on deck in thirty to forty seconds, or may even be launched while collapsed, then forming a raft. It can be geared up as readily afloat as on shore, is strongly built on the lines of the ordinary type boat, and is easily handled and equally seaworthy.

It can be used as a ship's boat, and also for general purposes. Unlike collapsible boats generally, the "Oxford" is built with a stem and transom, making it practically the same shape as the ordinary pattern. Hence, it is suitable for ships' steam yachts or launches and for racing yachts, and especially for expeditions and surveys, in connection with which a boat may have to be carried across country. There are three standard sizes of ships' boats, 21 ft., 25ft., and 28 ft. length, 7 ft. 6 in., 8 ft., and 8 ft. 6 in. beam, the depths being 3 ft., 3 ft. 3 in., and 3 ft. 6 in.; the collapsed depths being only 12 in., 14 in., and 14 in. The 21 ft. boat weighs 14 cwt., the 25 ft. 16 cwt., and the 28 ft. 18 cwt. They are sent out complete with slings and steering crutch, ash oars, water beaker, boat hooks, anchor, etc. Nearly all the collapsible boats taken by the new R. M. S. P. Co.'s steamer "Arlanza" are the "Oxford" collapsible. Fig. 1 shows the "Oxford" boat empty, and Fig. 2 as slung from davits.

HONG KONG MOTOR BOATS FOR CANADA.

HONG KONG shipyards are developing considerable trade in motor boats with various parts of the world, notably with Canada, in a way to affect American export of such vessels. One local yard has made several important contracts for building motor vessels of various sizes, 10 motor launches or yachts being recently completed for a Vancouver firm in a series of 31 vessels, varying in length from 25 to 60 feet. These vessels have been priced a little below that prevailing for such vessels in central and eastern United States. They were made to special plans, however, and are not standardized like similar vessels in the United States. The Canadian trade could therefore be more perfectly catered for. This Hong Kong trade is greatly aided by much lower ocean freight charges to the Canadian Pacific coast than rail freight thither from eastern United States points, where such boats are constructed at a minimum price. The cost of constructing such vessels on the Pacific coast, because of high cost of labor and of certain materials, is too great to permit competition with Hong Kong yards.

Voluntary Trade Orders.

Possible business in Canada and the United States on either coast seems not to have been canvassed by Hong Kong builders, trade coming to them through low cost of construction. The capacity of Hong Kong yards is practically unlimited. The yards are prepared to handle any size or shape of vessel from the smallest launch to large ocean-going steamers, the large docks taking the largest vessels on the Pacific with considerable margin. The Hong Kong yards now have almost a monopoly of the Philippine business in all lines of larger vessels, and previous to free trade between United States and Philippines had nearly all the business in vessels of all sizes and grades. The free admission of American motor boats and a 50 per cent. ad valorem duty on vessels from elsewhere stimulated Philippine imports of smaller American vessels. Hong Kong vessels are also sold in Australia and in various other portions of the Pacific.

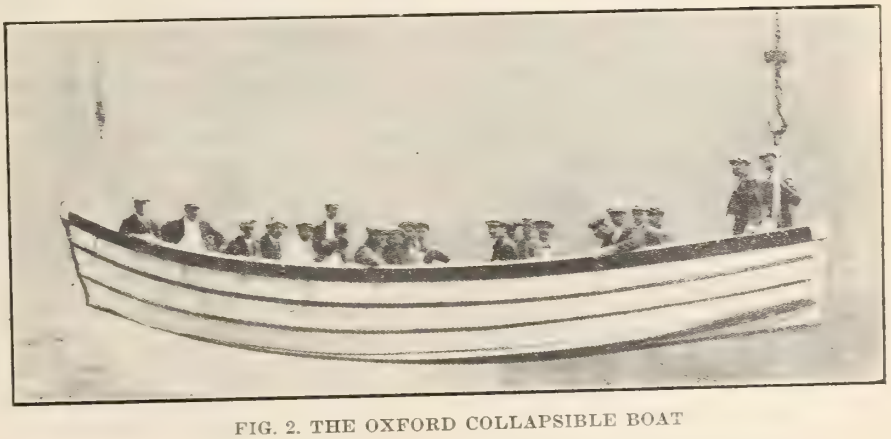


FIG. 2. THE OXFORD COLLAPSIBLE BOAT

The boats constructed to Canadian orders are made of teak, the interior being finished largely in Philippine hard-

woods, particularly Philippine "mahogany." There is a growing use of Philippine hardwoods in all such work in Hong Kong dockyards and elsewhere in the Far East. Motors for the boats for Canada have been largely of American make, including the product of Canadian factories of American concerns. Among the motors so far used are the Canadian Fairbanks, the Atlas, the Eastern Standard, the Western Standard, the Loew Victor (Cleveland), the Speedway (Morris Heights, and the Atlas Gas (San Francisco). The heavy passenger and freight boats built for use by China upon the West river in public service have nearly all been fitted with Gardner (English) motors. A Martin (English) and Thorneycroft (English) have been used respectively on two pleasure boats, and one German motor (Deuch) has been used on a pleasure boat for a German patron. It is significant that most motors for the heavy commercial boats so far have been of English make—heavy, slow-revolution units with few working parts and employing kerosene as a rule, while motors for the lighter, faster and more attractive vessels, particularly those for Canada and Australia have come from the United States.

All Vessels Made to Order.

All construction, both of large vessels and launches, in the Hong Kong yards is to order, and vessels are built individually, i.e., not from standardized parts, so there is probably no prospect of building such vessels for the general trade in large numbers except upon specific order. Nevertheless, the fact that a considerable trade is already being done, without any particular effort to secure it, merits attention. Hong Kong shipbuilders have for several years been producing motor vessels of many sorts for use on Chinese inland waters, which trade they will probably hold definitely for all except perhaps a few small, fast, light boats for special purposes. The fact that they will also be able to compete successfully with United States, English and other boats in several parts of the world may be taken as thoroughly established.—(United States Consular Reports.)



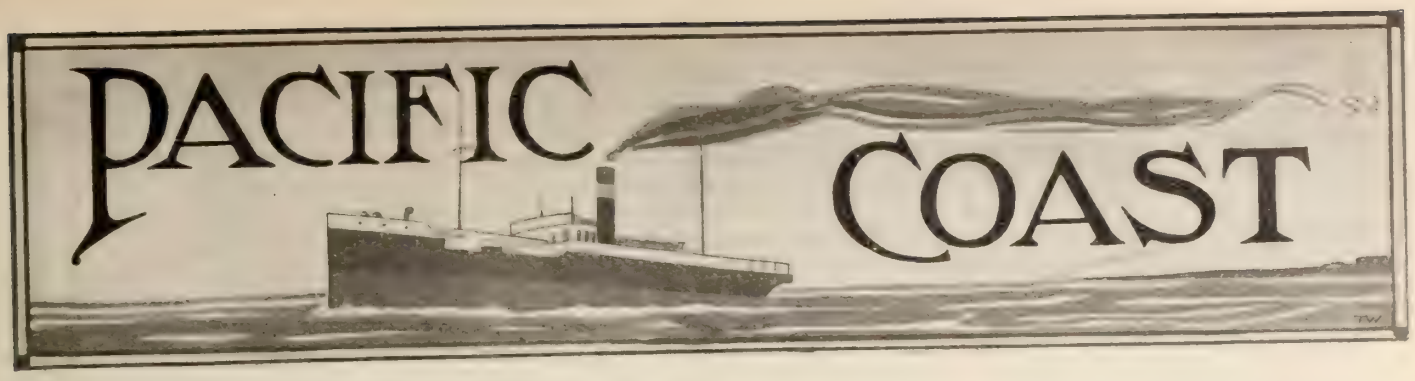
A LITTLE ROLL.

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WHARF IMPROVEMENTS AT BALBOA PANAMA CANAL.

THE framework for six of the eight new cranes to be erected on the Panama railroad wharf at Balboa has been carried to full height, 62 feet above the tops of the supporting rails. One of the cranes is complete, except for portions of the electrical wiring. Its 78-foot boom projects about 40 feet beyond the edge of the wharf, in horizontal position, and the crane will be capable of lifting 4 tons in a load, and carrying it up and along the boom at the rate of 600 feet a minute. The crane is to be capable of moving along the face of the dock at the rate of 120 feet a minute. It weighs 60 tons, and is equipped with one 25-horsepower, and two 115-horsepower, 220 volt, 25 cycle alternating current motors. Those yet to be completed will be identical in construction with the first.

In connection with the installation of the new cranes and the construction of track way to carry them along the face of the wharf, the outer side of the wharf is being converted from wooden to a concrete structure. For a depth of about 20 feet from the outer edge, the floor is being torn up, and after the girders have been reinforced with additional plates, a heavy reinforcement concrete floor, with embedded track, will be laid, in place of timber. The work also involves removing a portion of the roof over the wharf, to give room for the new and larger cranes.



TYPICAL CANADIAN 40-FOOTER.

THE raised-deck type of cabin cruiser has now become generally accepted, in Canada, as a standard class, and practically all small motor yachts are of this design, especially in British Columbian waters. A typical boat of this construction is a 40 ft. cruiser recently built and engined by the Canadian Fairbanks-Morse Co. Her beam is 8 ft. 6 in., by 28 in. draught, and the engine is of the medium-speed four-cycle type, developing 25 h.p. There are two 100-gallon fuel tanks, two 50-gallon water tanks and a complete electric lighting installation. Arrangements have been made for the boat to be handled by one man, either from the cockpit or bridge deck, where complete controls are installed.

Accommodation.

Accommodation is provided for four persons, and in addition, a bunk can be fitted in the engine-room for a paid hand, which can be divided off by means of a curtain. From the forward state-room the deck can be reached through the booby hatch. This state-room is connected with a toilet room forward, which has one made-up berth with ample locker and drawer space beneath, an extension transom, clothes locker, and small bureau. The cabin, aft of the state-room and connected with it, has two comfortable extension transoms, sideboard, dish and glass lockers, folding table, lockers for charts and bedding, shelves and clothes locker. The skylight over the cabin is 6 ft. long, giving full headroom over the greater part of it; the booby hatch over the state-room also gives full headroom in that compartment as well as good ventilation.

The combined engine-room and galley has been designed to give comfort, utility of space, and convenience. There is a refrigerator to drain overboard, a galley sink with garbage shoot to below the water-line (this also acts as a drain for the sink) of sufficient size to take empty cans, potato parings, etc., that are usually dumped over the side. A mahogany grating extends from the bridge seat to the mast , and provides temporary seating space for four or five persons. The upper or raised deck is covered with canvas laid in hot glue and painted. The space within the rail is provided with a corrugated rubber mat. The deck alongside the extended trunk cabin is of white pine laid with black marine glue; the cockpit and after deck is the same, and is set off with mahogany water-ways.

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TENDERS FOR C. P. R. TRANSFER BARGE.

TENDERS are to be called shortly by the C.P.R. for the building of a new transfer barge which will be used to carry freight cars betwen Vancouver and Nanaimo. Plans and specifications for the new craft are now being decided upon, and it will not be long before they are ready to be distributed to the different shipbuilding plants for figures No details of the size of the barge have been made public as yet, but it is understood that it will be similar to Transfer No. 3, the last of the fleet to be built, which was constructed on the Isherwood system.

The traffic between the mainland and the island is so heavy that in order to cope with the situation, the company have had to take the above step. Three barges now operate between these ports, and while they are able to keep things clear most of the time, there is a jam every once in a while. Further, the business is continually on the increase.

It is less than a year ago since the No. 3 was launched from the British Columbia Marine Railway yards. She is one of the finest barges on the coast, and is capable of carrying a large train of cars, and also has a capacious hold in which can be stowed great quantities of freight. Most of the cars brought across the gulf to Nanaimo from Vancouver are bound for Victoria, and come here over the E. & N. Railway. It is surprising the business that has been worked up over this line during the past year, and it is evident that, providing the growth of Victoria continues, the track between here and Nanaimo will see freight trains running over it almost continually.

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OGDEN POINT BREAKWATER.

THE breakwater to be built from Ogden Point will be quite similar in construction to that which has proven successful at Naples. The design, as shown on the plans, follows closely that at the Italian port. There is also some similarity to the breakwater which has given good service at Algiers. The underlying principle of the breakwaters, there, is that of approximating the rubble mound as closely as possible to the form and foundations of an upright wall. The slope at Ogden Point will, however, have a greater slope on the sea side. At Bizerta, on the north coast of Africa, another breakwater built to a plan of like design, is exposed to violent gales, yet the structure has been found to answer very satisfactorily.

The building of the breakwater will enclose a large area of good water for shipping, and, with the concrete piers, warehouses, cranes, etc., the port of Victoria will be well equipped to handle the increasing shipping development. The greatest depth to which the breakwater will reach will be about 75 feet. The soundings made by Mr. D. R. Harris, C. E., recently, showing the depth to range to this figure at the deepest section, near the end of the work.

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PRINCE RUPERT VERSUS VANCOUVER.

THE steamship line to the Orient from Prince Rupert, as forecast by Mr. E. J. Chamberlin, president of the Grand Trunk system, and its probable effect upon the port of Vancouver, has recently been discussed in an interesting interview with Mr. W. E. Duperow, head of the G.T.P. passenger department in that city.

No Discrimination Against Vancouver.

"In this development it is clear," he observed, "that there will be no discrimination against Vancouver. Prince Rupert will obviously be the port which can best handle the grain from the West on account of the reduced time. It will, as Mr. Chamberlin pointed out, be a saving of two days; but, of course, we all recognize the importance of Vancouver from a trans-Pacific point of view . You may be quite sure that we shall not leave the situation open to competition, and that steps will be taken to meet the Van-

cover traffic by connecting up." Mr. Duperow drew a glowing picture of the Grand Trunk Pacific's ultimate policy, one which would develop its railroad and steamship lines to such an extent that a passenger might take a trip round the world upon them. "There has," he concluded, "always been a feeling among those connected with the G.T.P. that, sooner or later, we should have our own trans-Pacific and trans-Atlantic services."

British Columbia Fisheries.

The shore line of British Columbia extends nearly 7,000 miles, with a territory of nearly 30,000 square miles, abounding with commercial fish. The production for the season 1909-1910 amounted to $10,314,755. British Columbia fisheries are recognized as the best in the world, and wait only for the completion of the new Grand Trunk Pacific Railway into Prince Rupert to reach their full development. The field is practically unlimited, and its exploitation will bring results astonishing to the most optimistic. It is not only a question of herring fisheries. Halibut in Hecate Straits range from 50 to 300 lbs. each, and there are halibut banks in all directions. The spring or king salmon off Langara Island are caught by the Indians in incredible numbers. The "eolachan" gluts the river of the province for six weeks every year, while all the small streams are crowded with cohoe, hum-back, and dog salmon.

BRITISH SUPREMACY OF THE SEAS.

MR. CHURCHILL, speaking in the British House of Commons, recently, on the vote for ship construction, said that by refraining from laying down their ships till the last moment, the Admiralty had secured an enormous advantage, and had also retained their security. He was inclined to think that it would be desirable at a later date to make a proposal to the House with regard to the estimates with a view to the adoption of a system which would bring financial procedure more closely to actual conditions. The Admiralty had recently conferred with all contractors with a view to the punctual completion of all the vessels on which they were now engaged.

Fleet Strength.

With regard to repairs to the fleet, it was of the highest importance to reduce the proportion of ships in dockyard hands to an absolute minimum, and a committee of inquiry on the subject had just made its report. He hoped it would be possible to reduce the proportion of vessels in dockyard hands by adopting certain methods the committee had suggested. With regard to the relative number of battleships of Germany and this country in home waters, the actual number that we should have would be 41 as against Germany's 29; eight of our vessels would be at Gibraltar, but they would always be in home waters when our fifth battle squadron was cruising away from its home ports. In addition there would be a seventh battle squadron of eight battleships manned with the immediate reserve, and an eighth battle squadron incomparably superior to the last reserve squadron of any other country in the world.

They expected in the first quarter of 1913 to have 18 Dreadnought battleships by the time that Germany had 13; in the fourth quarter we would have 24 to 16, and in the last quarter of 1915 we would have 27 to 17. No new developments which could affect 1914 could now take place, and any new development which affected 1915 or 1916 could be dealt with effectively when it made itself known.

INCREASED ELEVATOR CAPACITY REQUIRED.

MR. A. A. Wright, Managing Director of the St. Lawrence & Chicago Steam Navigation Co., expressed himself recently on the need of more elevator capacity at many of our leading ports. "Montreal, he said, should have a grain elevator storage capacity of 10 million bushels to be abreast of the times and take care of her proper share of the trade. Instead of this, she has an elevator capacity of only two million bushels. The new elevator of the Harbor Commission, which was to be completed this autumn, will not be ready for use till next year. Even then, Montreal will have only a nominal elevator capacity of five millions of bushels and an actual capacity of four million bushels, for room must be left in the elevators to classify and not mix the grain. The net capacity on this account is about eighty per cent. of the nominal capacity."

Buffalo and New York.

Further, he said, "that it was fortunate for grain men that the route from Buffalo to New York existed, or the congestion at Montreal would be frightful. In the face of assertions and evidence that Montreal was greatly deficient in elevator capacity, her Harbor Commission last year was going to erect only a million-bushel elevator, and it was only at the urgent importunities of shipping men, who were fully alive to the situation, that the board finally consented to build a two-million bushel elevator. Lake captains say that they were sometimes detained eight or ten days at Montreal waiting for a chance to unload. In reality their vessels should be released in a few hours.

Buffalo Shipments.

Mr. Wright said that Buffalo shipped about one hundred million bushels of grain a year to New York, and had an elevator capacity of twenty million bushels. Besides, the barges on the Erie Canal could also take on board a great quantity of grain. Montreal shipped about thirty million bushels of grain a season, and her elevators at present could hold only two million bushels, and would hold only four million bushels next year when the new one is in operation. Montreal's elevator facilities, therefore, fall far short of Buffalo's on a percentage of the grain handled.

Rates Favor Montreal.

In speaking of the freight rates for the autumn, Mr. Wright said they would favor Montreal against the Buffalo-New York route. October grain from Fort William to Buffalo was now being quoted at two to two and a half cents a bushel for carriage and at five and a half cents a bushel from Buffalo to the Atlantic seaboard. This made a total rate of seven and a half to eight cents a bushel from the head of the lakes to the Atlantic Ocean by Buffalo. The Canadian rate would be about one cent a bushel less to Montreal. The rate from Fort William to Montreal is four and a half cents a bushel, or seven and a half cents a hundred pounds.

Discrimination.

Mr. Wright said that two things militated against Montreal as a grain-shipping port. One was, as he had mentioned, not sufficient grain storage facilities, and the other was discrimination in rates in favor of United States ports by the big ocean lines. In order to permit Canadian lake shipping to hold its own in competition with the lake shipping of the United States, Mr. Wright urges the providing of greater terminal storage facilities on the Georgian Bay ports.

The fleet of Canadian vessels in the lake grain trade will be considerably larger than last year's. In all there will be about one hundred.

WELLAND CANAL, 56 YEARS AGO.

IN these days of large vessels and immense freight cargoes, when one vessel brings into Port Colborne harbor 300,000 bushels of grain and one vessel takes through the Welland Canal one hundred thousand bushels of grain; when arrangements are being made to enlarge the Welland Canal so that a vessel can carry twice as much, the following, clipped from a paper fifty-six

years ago, becomes an interesting item:—"Largest Load through Welland Canal." The fine schooner W. S. Nelson, Captain Samuel Patten, cleared from the upper lakes May 16, 1856, for Oswego, with 18,200 bushels of wheat, the largest load that has ever cleared for Oswego from the upper lakes in one vessel. Captain Patten informs us that vessels have gone through the Welland Canal drawing ten feet four or five inches. One vessel, the schooner Countess, Captain Lindley, went through drawing ten feet six inches. The W. S. Nelson is 370 tons register, 137½ feet long, 26 feet beam and 11 feet 3 inches hold. She is rigged as a fore and after. She is owned by Messrs. William Baldwin & Co., of Oswego.

An improvement in the Canadian canal, which would admit vessels of greater length and drawing more water, would add immensely to the facilities of the lake and St. Lawrence route to the ocean."

OIL CONSUMPTION, MOTOR SHIP "SELANDIA."

AS the consumption of oil is a very important feature in connection with the motor vessel, the following particulars of the Selandia's consumption of this fuel may be of interest. The subjoined table gives some of the worst and some of the best days, and the average speed for the different distances on the outward and the homeward voyage. The weather, especially on the homeward voyage, was anything but favorable, yet oil consumption and speed remained fairly stable; and it is interesting to note that the oil consumption has gone down almost 2 tons per day from the commencement of the trip to its finish. A steamer would have used three to four times as much coal.

	Consumption of oil per day in tons.	Speed Knots.
Outward Voyage.		
March 11, 1912—The Atlantic; heavy sea, vessel works hard, taking much water over	9.8	9.2
March 13, 1912—The Atlantic; vessel rolls, and takes much water over	10.2	10.4
March 14, 1912—The Atlantic; no special weather report...	10.0	11.5
March 22, 1912—Mediterranean; no special weather report...	10.1	12.7
March 25 to April 6, 1912—Suez to Colombo; no special weather report .....average	10.0	11.5
April 9, 1912; no special weather report .....average	9.6	12.4
April 8 to 11, 1912: Colombo-Penang; no special weather report .....average	9.6	11.5
April 13, 1912: Penang-Bangkok; no special weather report ..... average	9.6	11.7
Homeward Voyage.		
May 11 to 16, 1912: Penang-Colombo; heavy, contrary sea ..... average	8.8	9.6
May 18 to June 1, 1912: Colombo-Suez; three days' heavy contrary sea, vessel working hard, taking much water over	8.7	10.0
June 2 to 8, 1912: Port Said-Genoa; no weather report ..... average	8.7	10.4
June 10 to 19, 1912: Genoa-Dover; heavy contrary sea and weather	8.4	9.6
June 19 to 22, 1912: Dover-Aarhus; no weather report...	8.0	10.3

The success of the Selandia and her sister-ship, sold to the Hamburg-Amerika Line, has brought their builders—Messrs. Burmeister and Wain—several orders, and they now have orders for nine motor-vessels, of an aggregate tonnage of 40,000 tons gross, whilst their orders for steamers is confined to one—a screw-boat.

HENRY BELL MEMORIAL.

COMPARISONS between the Clyde of 1812 and that of 1912 are of very little value, because the river has changed wholly in its character within far less time than a hundred years. It is true, of course, that "the Clyde has never lost the prestige that it owes to Henry Bell," but without the work of those who came later, that of Bell could never have come to full fruition on the Clyde.

We are not celebrating the present-day greatness of the river or of steam navigation, but the work of a then obscure man who had faith in an idea, and who proved that his idea was of practical value. To place the Comet and the Lusitania together and ask us to wonder at the contrast is futile because the Lusitania is not a development of the Comet, but of the previously best liner known to her owners and builders. So, while we may be proud of the vast commerce of the Clyde, we should remember that this commerce is the result of many years of steady progress, that many hands and many minds have helped to build it up, and that we can do no better service to the memory of those who were its pioneers long ago, and of those whose enterprise in later years developed and increased it, than by endeavoring to make sure, so far as we possibly can, that it will continue to increase in the future.

Symington and Bell.

Mr. McKinnon Wood said that William Symington and Henry Bell "gave Scotland the high honour of being the birthplace of steam navigation in Great Britain." He might have said with truth "on that side of the Atlantic." If he had deleted the name of Henry Bell, he could have said "in the world," because William Symington was the real pioneer of marine engineering, and we can appeal for support for the "Henry Bell Memorial" in connection with the Royal Technical College on no stronger ground that it should perpetuate the fame of Symington as well as that of Bell, and preserve to Scotland the credit of being the unquestioned birthplace of marine engineering—without any geographical qualifications whatever.

Its real value will lie, however, in what it may do for the furtherance of scientific investigation, both in shipbuilding and engineering, and in this way continuing for many years to come the long story of progress initiated under such adverse circumstances in the summer of 1812.

SAFETY OF LIFE AT SEA.

THE draft rules for the Safety of Life at Sea, now issued by the British Board of Trade under the Merchant shipping Act of 1892, necessarily follow in the main the recommendations contained in the report of the Titanic wreck inquiry. The rules now published do not cover the whole scope of that inquest, since two separate Committees have still to report, one upon Watertight Bulkheads and the other on Boats and Davits.

Foreign Trade Ships.

For ships engaged in foreign trade and for the ocean passenger steamer, the first important provision laid down is that sufficient lifeboats are to be carried for all on board. This has already become the practice on the majority of ocean-going liners since the loss of the Titanic. The number of boats in davits is to be increased, being in the proportion not to the tonnage of the vessel but to her length, and the davits are to be amidships. Lifeboats are to be of prescribed build, and collapsible boats will cease to rank as lifeboats "after a certain period." The method of testing lifeboats is to be altered, and a larger proportion of motor boats may be allowed. The lifeboat equipment is to be enlarged; it must be stowed in the boat when the ship leaves port and remain in the boat, whose capacity is to be marked upon it.

Another important provision is the abrogation of the previous rule that fewer boats might be carried on account of the subdivision of the ship by water-tight compartments. Half the lifebuoys carried are to be fitted with ignition apparatus.

Home Trade Ships.

The regulations for home trade passenger ships are naturally less stringent. These rules with their promised modifications, will come into force on January 1, 1913, but when structural alterations are required a further extension of time will be given, until the ship next comes up for survey. In the matter of wireless telegraphy, action will be postponed until after the proposed international negotiations; and routes and speed in relation to ice are also to be the subject of international discussion.

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Vol. II SEPTEMBER, 1912 No. 9

THE LESSON STILL UNHEEDED.

IN spite of the clearly demonstrated fact that the "Titanic" was annihilated through the maintenance of excessive speed in a sea zone studded with giant icebergs, and that other mishaps have since occurred, less calamitous, undoubtedly, from the same or other causes, it seems strange that apparent deductions all tend towards accentuation of the desire to produce an unsinkable ship. The latter, like perpetual motion, is a myth unworthy of the serious consideration of 20th century thought and we are more than surprised at the efforts being made to bring the consummation about.

The regulation and condemnation of the speed craze in treacherous weather or in dangerous surroundings is the plea of common sense, and while every legitimate effort should be made to ensure the greatest degree of safety construction and equipment, it should not be forgotten that there will be more or less vulnerability which cannot be constructively combated, and which can be most satisfactorily protected by the reduction of the impact force. The multiplication of hull and equipment accessories is in our opinion but a prolific source of weakness.

CANADIAN LLOYDS.

THERE is still a hankering after the establishment of a Canadian Lloyds among certain sections of the shipping community, although the record of the past season in the River and Gulf of the St. Lawrence and its approaches has not been such as to inspire a too high degree of confidence in the ultimate success of such an institution. While it is true that even the broad Atlantic has shown an unparalleled disposition to play "fast and loose" with the galleons of commerce during the past season, "two blacks do not make a white," therefore, the mishaps which have been more or less attributable to the natural features of the St. Lawrence route should be carefully considered in figuring particular benefits to be apparently derivable from the operation of a purely Canadian Protective Society.

The Port of Montreal, due to the commendable enterprise of its Harbor Commission, backed by its influential shipping community, continues to develop in its scope, its equipment, and dock accommodation, and we are quite sure that while the desire for a reduction in insurance rates would be generally welcomed, there is little doubt that the greatest satisfaction in respect to this would be that obtainable from the British Lloyds. We are aware that the chairman of the Montreal Harbor Commission has expressed himself strongly on the matter and with much show of reason why shippers should be so favored, yet we cannot help noting that the rebuffs handed out in the past have in no wise militated against the progressive development of our principal port or have decreased its popularity as an inlet of and outlet for our commerce. It has recently been announced that still further increases to the elevator capacity of the port are projected and in progress, and we are disposed to think that, concurrent with the general harbor and channel improvements which are going forward without intermission, if a comprehensive scheme of elevator accommodation be provided, there will be no lack of grain cargoes delivered there for Trans-Atlantic shipment, even in face of the apparent tendency to meantime favor American Ports.

A Canadian Lloyds must depend for its successful operation on Government subsidy or some such similar method, which, of course, means that the public would be called upon ultimately "to pay the piper."

A Canadian Lloyds, nevertheless, is no remote possibility, but it is due to the people of Canada, that the development of a higher degree of attainment and prominence in the shipbuilding world should have the first and most pressing attention through legislative action in preference to this, or any other accessory feature.

SHIPBUILDING ACTIVITY.

REPORTS from those countries in which the art and science of shipbuilding and marine engineering is practised indicate in the most emphatic manner, extreme activity combined with an immediately prosperous outlook. In the Old Land, where these industries flourish as they do nowhere else, there is already evidence of a record year falling to be chronicled, and in our own Dominion, all the more prominent concerns from the Atlantic to the Pacific are operating to capacity. If one may judge by the increased prosperity visible in our Canadian shipyards, the trend towards intensive propagation of this particular industrial feature is certainly very marked

The arrival of the floating ship dock, which we hope to chronicle in our next issue, and its installation at the shipyard plant of Vickers Ltd., in Montreal, will serve to direct increased attention to what is as yet, probably Canada's "baby" industry. Much we know hinges on the policy to be adopted by our legislators on the naval question, but now that the period of cheap talk of and vacillating attitude towards the subject have become nauseous and stale even to their devotees, we are hopeful that the early future will proclaim not only a policy of high degree support to the Motherland in affairs naval, but in addition give consideration to the growing demand for the development of shipbuilding and marine engineering within our borders.

Marine News From Every Source

British Columbia

Vancouver.—Captain W. J. Starkey, the skipper who brought the steamer Chelohsin of the Union Steamship Company out to this coast last winter, is now crossing the Atlantic with another vessel for Vancouver, the steam trawler Trymple, which will be used by the British Columbia Fisheries Company in its fishing operations off the Queen Charlotte Islands. Sir George Doughty, head of the company, is expected to be in Vancouver shortly, it being expected that he will arrive about the same time as the vessel that Capt. Starkey is bringing out. The head office of the company in British Columbia is at Victoria, and the intention is to have a large number of trawlers engaged in the business off the British Columbia coast, it being stated that the company's fleet, as already planned, will consist of some forty bottoms. All the larger boats will be brought here from England. Sir George Doughty's home is at Grimsby, and, in addition to his interests in the North Sea fisheries and along the coast, he is also connected with fisheries in South Africa where he has already sent a fleet of over half a dozen trawlers.

Prince Rupert.—Sir George Doughty, of Grimsby, England, head of a new British fishing industry in Canada, was recently in Prince Rupert and stated that in the near future his company would establish a great fishing centre on the Pacific coast. A large part of this development is being advanced on Queen Charlotte Islands, and as time passes, other locations will be established in the vicinity of Prince Rupert. It is understood that when this Canadian project is fully developed the concern will launch out upon a similar scale in South Africa, Australia, and Siberia, when it will be the biggest industry of its kind in the world. To Earl Grey, who is interested in the proposition, is said to belong the credit of having suggested the establishment of a fishing industry in British Columbia.

Victoria.—Perhaps no vessel has ever in the history of Victoria come in with such a valuable and diversified cargo as that brought here by the big Blue Funnel liner Titan, Capt. Evans, which arrived at the outer docks on August 30, from Liverpool via Oriental ports. She had stowed away in her strong-room 3,000 bales of silk valued at $1,500,000, which is the richest shipment ever sent from China. Several liners have carried shipments well over the million-dollar mark, but none have reached the amount, which was brought in by the Titan.

Victoria.—The Marine and Fisheries Department has awarded a contract to the North Coast Construction Company for the erection of a lighthouse and fog signal station at Holland Point.

Victoria.—About the end of October the new C.P.R. steamer building at the B.C. Marine Railway yards will be ready for launching. The new Princess, being constructed for the west coast run also is making excellent progress. The new Princess is being built to burn oil, and will be the largest vessel yet launched in British Columbia waters.

The engines and boilers to be installed in the vessel, are being built in the Old Country. It is expected that the new Princess will be ready to relieve the Tees on the west coast service before the end of the year.

Coquitlam.—Work has been started on a shipbuilding plant at Coquitlam, capable of turning out vessels of from 300 to 800 tons. The company responsible for the enterprise will be known as the Coquitlam Shipbuilding & Marine Railway Co. Mr. L. D. Shafner, of Bridgetown, N.S., is president, and the capitalization is $500,000.

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The Great Lakes

Kingston.—Marine men are anxious concerning the whereabouts of the steam barge Adiramled, engaged in the coal trade, on Lake Ontario. The fear is expressed that she may have gone down with her crew, M. J. Morris, of Montreal, owns the vessel, and every effort is being made to get trace of her. The vessel was built in Cleveland in 1866, and has now not been heard of for two months. She carried a crew of four men.

Kingston.—The schooner Oliver Mowat, of Bowmanville, went ashore at Yorkshire Island, The Ducks, on the night of September 16. The Mowat cleared from Swift's Dock the previous afternoon, after unloading coal, and was light, on her way to Oswego, when she ran aground. It is understood that there was a heavy fog at this end of the lake at the time. Water was let in to steady the ship, and the steamer Donnelly, of the Donnelly Wrecking Company, went to her assistance. Capt. Peacock, of Port Hope, who is part owner of the vessel, was in charge.

Kingston. — The steamer Casplan, which went aground at Presque Isle, Brighton, on the night of September 15, was released by the Calvin Company steamer Cornwall about eight o'clock the following evening. The damage was very slight to the excursion steamer, and she proceeded on her trip to Charlotte.

Amherstburg.—With a draft of 15 feet 10 inches, the freighter Norway upbound through the east channel at Ballard's Reef, September 17, struck an obstruction opposite the place where the drill boats are at work. The depth at the crossing was 16 feet 3 inches. The Norway was not damaged.

Toronto.—A Company has been formed with the object of opening steel works yards at the foot of Bathurst Street in the property formerly occupied by the Canadian Shipbuilding Company. It is the intention of the new company to reopen the works without delay. Several hundred men will be employed in the manufacture of structural steel. The company will also engage in tank and kindred work at first, but they will eventually branch out into marine work on a large scale. Mr. J. E. Russell, of Toronto, is interested in this new company.

Ottawa.—The Canadian Government has awarded to the Dublin Dockyard Company, Dublin, Ireland, a contract for the construction of two fisheries protection vessels to be used in preventing United States fishermen from poaching in the waters off the west coast of Vancouver Island.

Kingston.—Coming into port from Oswego in a heavy gale, the schooner Keewatin collided with the steamer Aletha at Swift's wharf and the schooner suf-

fered a broken bowsprit. The bowsprit caught under the stern deck of the Aletha and almost raised her out of the water, causing much excitement among those on board. The Aletha suffered slight damage.

Grafton.—A rival is likely to appear in the car ferry business across Lake Ontario, according to local reports. At the present time the Cobourg-Charlotte ferry ,which is operated jointly by the Grand Trunk and Buffalo, Rochester & Pittsburg Railways, has a monopoly of the freight ferry business, and the Canadian Pacific Railway, in consequence, sends most of its freight to Rochester by the longer route, via the Toronto, Hamilton & Buffalo. The new C.P.R. Lake Shore Line, however, between Toronto and Montreal will bring the C.P.R. in close competition with the Grand Trunk along the north shore of the lake, and it is stated on excellent authority that the company will inaugurate a rival car ferry from Grafton to Charlotte as soon as the new road is ready. Residents in Grafton have been told that the C.P.R. intends to build an extensive dock there almost immediately, and the locality is confident that this is the first step towards a big car ferry service. Grafton is as near to Charlotte as is Cobourg, while its residents claim that it possesses even greater possibilities as a harbor.

Collingwood.—On the afternoon of September 18, the Keybell, the latest addition to the fleet of the Keystone Transportation Co., Ltd, of Montreal, was launched at the yards of the Collingwood Shipbuilding Company. The ceremony of christening the new boat was performed by Mrs. McMillan, wife of Mr. Levy McMillan, of John Reid & Co., Montreal, superintendent of construction, on the part of the owners. The new steamer is full canal size, of length 258 feet, beam 42 feet 6 inches, with a moulded depth of 20 feet and having a carrying capacity of 3,300 tons, or about 110,000 bushels of wheat. She is built of steel throughout, and will be driven by triple expansion engines, 16, 26, and 44 inches, by 36-inch stroke, supplied with steam by two Scotch boilers, 11 ft. 6 in. by 10 ft. 6 in.,, carrying a working pressure of 180 pounds. The vessel is of the single deck type, constructed on the arch and web frame plan, which leaves the holds unobstructed for handling cargo by clam-shell bucket system. The equipment consists of cargo derricks and gear, electric light plant and steam auxiliaries usually fitted in a high-class vessel. The ship has been built for service on the Great Lakes and Atlantic Coast, and is expected to be completed and in service very shortly.

Kingston.—The schooner Oliver Mowat is in the Davis drydock, after being released from Yorkshire Island, twenty miles above here, by the Donnelly Wrecking Company. She sustained very little damage. Good weather prevailed and the wrecking company was able to do quick work.

Kingston.—The Donnelly Wrecking Company, of this city, has sent down an outfit to the Beauharnois Canal to raise a sunken dredge belonging to L. Leitch, of Montreal. The dredge is in 21 feet of water.

Owen Sound.—W. S. Middlebro M.P., has received intimation from Government Engineer J. G. Sing, to the effect that the harbor improvement work at Owen Sound would be undertaken about the end of the present month. The contractors are Messrs Bishop & Buchanan, who have just completed a big Government job near Peterboro. The dredge and building paraphernalia are on the way to Owen Sound now. The work in question contemplates the removal of between three and four hundred feet of dock on the west side of the harbor running from the present concrete revetment wall north of Tenth street bridge to the southern limit of the Grand Trunk property. This part of the harbor is now rendered unsightly by old wooden docks and rotten wooden piling surmounted by ramshackle frame buildings, all of which will be removed and replaced by most modern concrete reinforced and revetment wall and dock. It is improbable that the entire work will be finished during the current year; the whole work will cost about $50,000.

Sarnia.—When the steamer Beard approached the dock here, on the morning of August 24, there was a good-sized crowd to welcome the little craft. She is no longer a ferryboat, but a freight and passenger steamer. After the passengers were taken aboard, and before leaving the dock, the captain stepped ashore and secured a clearance paper, after paying the necessary fee. This regulation will be observed on every trip by every captain. It is understood that a number of Sarnia business men have started a movement to purchase the Clark dock,north of the present ferry dock, and offer it to the present company or any other company which may desire to engage in the ferry business. The amount needed to purchase the dock is $5,000, and it is said that one hotelman alone will subscribe $500.

Port Arthur.—A number of new buildings in connection with the plant of the Western Dry Dock and Shipbuilding Company are being erected. In order that the powerful new motors may be installed before the cold weather sets in, the power house, work on which has just been commenced, will be rushed to completion. A small office for the use of one of the officials of the company has been erected in the midst of the works. A garage for the accommodation of the company's automobiles has been erected at the entrance to the dock.

Ottawa.—Applications for tender forms have been received at the Trade and Commerce Department from a number of steamship companies likely to make proposals for the improved steamship service between Canada and the West Indies. Tenders will be received to October 1, and the new service provided for in the reciprocity agreement with the Islands is expected to lead to a noteworthy increase in trade.

Port Dalhousie.—The steamer Frontier of the People's Line, and commanded by Captain Enright, of St. Catharines, foundered outside the entrance to Muir's drydock here on September 6. The vessel had sprung a leak and was preparing to dock for examination when the mishap occurred.

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Montreal and Quebec

Montreal.—The Canadian Pacific liner Lake Champlain ran ashore on September 3, off Boucherville Islands near here. A heavy fog covered the river at the time, and it is supposed that the pilot lost his reckonings.

Montreal.—During August, 56 ocean steamers arrived in the port of Montreal, as compared with 73 in May, 54 in June and 62 in July. Judging from the list of ships bound for Montreal, the number of arrivals during September should exceed the total for August considerably. The 56 vessels for August had a combined gross register tonnage of 393,369 tons. There were 12 Allan liners, with a combined gross register tonnage of 107,530 tons, made up of the Corsican, Scandinavian, Ionian, Victorian, Grampian, Tunisian, Lake Erie, Pretorian, Virginian, Hesperian, Corinthian, Sicilian. The Willehad was the only representative of the Canada line for the month, tonnage 4,761. There were 8 C.P.R. liners; the Montrose, Montcalm, Lake Champlain, Montfort, Lake Manitoba, Mount Temple, Mommouth and Lake Michigan, 55,438 tons. The Ausonia, 7,906 tons, was the only Cunarder for the month, and the Spheroid, 3,380 tons, was the only Direct liner. The Dominion line had 3 steamers; the Cornishman, Welshman and Turcoman, 17,089 tons. The Donaldson line was represented by the usual quartette, Letitia, Saturnia, Cassandra and Athenia, 36,970 tons; the Elder-Dempster line by two, the Bornu and Kaduna, 7,693 tons; and the Furness line by one vessel, the Dalton Hall, 3,538 tons. Three steamers belonging to the Head line arrived; the Bengore Head, Ramore Head and Inishowen Head, 9,684 tons. The Manchester liners numbered five; the Importer,

Commerce, Shipper, Miller and Corporation; tonnage 23,063 tons. The Walwera was the only New Zealand liner, 6,237 tons. but there were three visits from Royal liners, the Edward coming here twice and the George once, 34,234 tons. There were four Thomson liners; the Hurona, Fremona, Devona and Iona, 13,877 tons, and five White Star boats; the Teutonic twice, Laurentic, Canada and Megantic, 59,151 tons. Tramp steamers were two in number, the Arnfrid and Spiral, 2,778 tons.

The Quebec Salvage & Wrecking Co., Ltd., Montreal, of which Mr. Andrew A. Allan, of Montreal is president, and Mr. G. D. Davie, superintendent, have purchased the Salvage Plant of Geo T. Davie & Sons, Levis, Que., consisting of The Irwin screw steamer, "Lord Strathcona," the schooner "G.T.D.," together with pumps, boilers, etc. In our June issue it was inadvertently stated that the ship building and repairing plant had been acquired also.

Maritime Provinces

St. John, N.B.—The Daly and Hannan Dredging Co., one of the largest and best known concerns of the kind on the St. Lawrence River and Great Lakes, has been taken over by the Norton Griffiths Co., with head office at St. John, N.B. The money consideration is said to be half a million dollars. The plant is located at Ogdensburg, N.Y. Ex-mayor Hannan of that town and Secretary T. J. Dineen of the old company will retain their cinnection with the new concern asd will in future reside in St. John, where the company has secured very extensive contracts.

Halifax.—The auxiliary schooner Monica A. Thomas was totally destroyed by fire at Louisburg recently under dangerous circumstances. The schooner had just been fitted out for sea and the crew were filling the tanks with gasoline, when an explosion occurred which blew off a large portion of the deck, injuring a number of the men, although none seriously. The vessel was towed from the dock and beached, but the flames burned so fiercely that nothing was saved.

Prince Edward Islands.—The period which the Government set for the receiving of tenders for the construction of a car ferry to run between the mainland and Prince Edward Island, has expired. A number of bids are now under consideration, and the contract will be let with all possible despatch. If possible, the service will be started this winter. It will run from Cape Tormentine, N.B., to Charlottetown, a distance across the Straits of Northumberland of nine miles. The starting of this service, which is the first real step yet taken by any Dominion Government to carry out terms of a contract under which the Island Province came into Confederation, will involve the taking over by the Government of a short branch railway which connects Cape Tormentine with the main line of the Intercolonial.

General

Fishery Protection Cruisers. — Two fishery protection cruisers for service off the Pacific coast have recently been ordered by the Canadian Government from the Dublin Dockyard Co., Dublin, Ireland. This enterprising firm has been established for over a decade, the members having previously occupied prominent positions on the staff of Wm. Denny, Bros., shipbuilders, Dumbarton, Scotland, who with Denny & Company, of the same place have a world-wide reputation in naval architecture and marine engineering. In recent years the Dublin Dockyard Co., have built a number of vessels of somewhat similar design to fill a like purpose, for various marine and Government corporations, while on the Pacific coast of Canada, the "Chelosin," etc., built for the Union Steamship Co., Vancouver, gives tribute to their capacity in undertaking marine work particularly adapted to Canadian requirements.

Ogdensburg, N.Y.—The steamer Britannic, which went ashore in the St. Lawrence at Weaver's Point, below Morrisburg, was abandoned by wreckers after two week's unsuccessful effort to release her. The vessel, which was owned by H. McMorran, of Port Colborne, Ont., was returning light from Montreal when she became disabled in swift water.

London.—Failure to go to the relief of vessels in distress is a misdemeanor punishable by two years' imprisonment according to a notice sent to ship's captains to-day by the British Board of Trade. In the circular, which was issued as a sequel to the recommendation of Lord Mersey after the Titanic enquiry, the Board of Trade expresses its confidence that such services will be rendered in the future as in the past in accordance with the best traditions of the merchant marine.

Detroit.—Two big steel steamers went hard aground at the head of Stag Island, in St. Clair River, on September 17. The first to strand was the James Gilchrist, bound down with iron ore. Some time after the Gilchrist struck, the Nottingham came along and her captain became confused, when he saw the Gilchrist aground. His vessel struck 500 feet to the westward of the Gilchrist.

The St. Lawrence Route.—Underwriters on vessels going to the St. Lawrence or in that direction are very careful of their "lines" just now, in view of the reports concerning ice-fields. The Cunard Company's agent at Montreal reports that a large number of icebergs have been located 130 miles south of Belle Isle.

THE NEW WELLAND CANAL.

THAT the new Welland Canal will compare favorably with the Panama Canal in many ways, and will be the largest in Canada, is the statement mde by J. L. Weller, Superintending Engineer of the new Welland ship canal. "It is almost as great an undertaking from an engineer's standpoint," says Mr. Weller, "as the lock walls will be practically of the same height as those used in the Panama Canal." It is expected that tenders will be called for this winter for the enlargement of the canal. The work will start early next summer. A large force of draftsmen and civil engineers is now engaged on the plans, while many drillers and engineers are at work along the route of the new waterway. The outside work is almost finished, and plans of the new undertaking will be in the hands of the Government at an early date.

When the construction actually commences, at least 50 or 75 steam shovels and a dozen dredges will be set in operation. Work will proceed contemporaneously at several points along the route. Navigation will not be impeded to any extent, but more rapid progress will be made during the winter, when there will be nothing to hinder.

The old channel will be used from Port Colborne as far as Thorold, at which latter place the new course will commence, and diverging somewhat to the east, will strike Ten Mile Creek and enter Lake Ontario near McCalla's Grove, three miles from Port Dalhousie, the present outlet. The length of the new section will be eight miles, and the total length of the waterway, when completed, 25 miles. At Welland, the east bank will not be touched, but widening will be done on the west bank.

Mr. Weller estimates that the canal will occupy about five years in building, the whole costing in the neighborhood of $50,000,000.

MERCANTILE CRUISERS TO LINK EMPIRE.

A PRESS report states that in view of a steady rise in shipping shares and fresh projects for linking up the Empire by means of subsidized merchantmen, convertible into cruisers in time of war, it is interesting to note that two shipping companies, the Allan Line and C.P.R., are introducing changes in the

design of their new ships which will be placed in commission early next year. The four new Atlantic and Pacific liners will embody many improved features. They will have what is known as the cruiser stern, which has hitherto been peculiar to warships. One of these vessels, the Empress of Russia, has already been launched, and the other three will be ready for service in May next. The C.P.R. is also credited with a fleet of liners capable of doing twenty-four knots and covering the distance between Liverpool and Halifax in less than four and a half days.

In shipping circles it is understood that the equipment of these liners was one of the subjects discussed by Premier Borden and the Canadian Ministers while in London.

PUBLIC WHARVES PLANNED FOR TORONTO.

INITIAL plans have been drawn for a new free wharf under control of the Harbor Board, which will accommodate five vessels. Work, it is expected, will be commenced early next spring. The new wharf will be located west of the present Harbor Square wharf now leased to the Canadian Lake Line and the Inland Lines, near the foot of York street, and will jut out into the bay for a distance of some six hundred feet, one hundred feet farther than any existing wharf. It will be solid, with the water at each side, and will be equipped with huge freight sheds and a railroad spur, making it one of the finest on the great lakes.

The general plan has been taken from the deep-sea wharves at Boston and those at Montreal.

Ocean Tramp a Common Sight.

It is expected that the ocean tramp will not be an uncommon sight in Toronto harbor once the new wharf is built, as there are many cargoes that, with free wharfage facilities, will stand water-borne transport from Europe to Canada. The lease of the present Harbor Square wharf, which belongs to Toronto, expires at the end of next year, when it is probable that the Harbor Board will take it over, remodel it and include it in the proposed general scheme. The cost of the new wharf will be in the neighborhood of a million dollars.

One Public Wharf Ready Next Year.

One public-owned wharf will be ready to receive cargo about the middle of next season, being that which the Harbor Board is building at the foot of Cherry street at a cost of $204,000. This pier extends six hundred feet out, and is one hundred and seventy-four feet wide. Work on it will be pushed throughout the winter, as the cribs are already in place.

PANAMA CANAL AND U. S. SHIPBUILDING.

A NAVAL architect, formerly connected with the firm of John Roach & Sons, writing in a recent number of the "Journal of Commerce," outlines a number of phases of the problem of development of United States Shipbuilding.

Entry of Foreign Ships.

American history, he says, has an instructive chapter which may well be reread at the persent time. It takes us back to the period immediately following the Civil War. The foreign ships, largely British, which had injured us so much during the war, came back to injure us anew. America was flooded with cheap foreign vessels, purchaseable under the then existing conditions. These had been the blockade-runners of the Confederacy. The present legislation for free entry of foreign ships is a remnant of the same idea. It will have the same results.

The promise of assistance to American shipbuilding by the free entry of materials for the purpose is misleading. A. L. Hopkins, president of the Newport News Shipbuilding Co., has indicated that the reduction to be accomplished by this will not amount to 5 per cent. on the cost of materials. The cost of labor is more than 30 per cent. greater in this country. The free entry of foreign materials will not decrease this.

Foreign Imports.

Foreign countries are importing material from this country. Only the other day a Scotch firm attempted to get on this side 50,000 tons of raw materials for steel plates. Where, then, could we get foreign materials To this must be added the delay, and the question of the margin of profit, and the need of big warehouses. On the other side, the cost of material on a contract is 35 to 40 per cent. The cost of labor is about 65 per cent. The overhead charges are one-half of the material charges. In small yards, with small contracts, where is the profit? The maintenance of the plant reduces to nothing the profit. The large plants which are able to handle the big contracts—a million or more for a vessel—can hope for some profit, if they can get the big trade or the foreign trade which they desire. We already have a rebate of about 97 per cent. on imported shipbuilding materials. The new bill gives nothing new, nor anything more, but the flooding by free ships will ruin the hopes of American shipping expansion.

Shipbuilding Activity.

Increased activity is noted in shipbuilding along the Atlantic and Pacific seaboards. Ship-yards are the busiest for years, and have now under contract fifty freight and passenger steamers, besides nineteen other vessels, such as car ferries, colliers, tugboats and lighters; also 45 vessels of various kinds building for the United States Navy. The New York Shipbuilding Co. of Camden, N.J., alone has 25,000,000 dols. worth of work on its books, and the total value of work under way is in excess of 100,000,000 dols.

Four new steamers are being built at Cramps for W. R. Grace & Co. These ships will be operated under the United States flag, and will require about 30,000 tons of steel. The American-Hawaiian Steamship Co. is building at the yard of the Maryland Steel Co. eight steamers for service between New York and the Hawaiian Islands, each one of which will require 7,500 tons of steel plates and shapes, or a total of 60,000 tons. It is safe to say that the other 44 steamers, consisting of Oil Tankers, Coastwise, Sound and River steamers, will require an average of 1,500 tons of steel each, or at least 56,000 tons altogether.

Fifteen steamers are being built by the Great Lakes shipyards for Coast account, eight for the Standard Oil Co., and seven for Coastwise Steamship Companies recently organized; the latter evidently preparing to take advantage of the new trade routes that will undoubtedly be developed by the opening of the Panama Canal. Shipyards are short of help, consequently there is some delay in new construction.

MID-SCOTLAND SHIP CANAL.

THE Mid-Scotland Ship Canal Association have revived the question regarding the construction of a canal between the Forth and the Clyde. The secretary expresses the belief, that the Admiralty are considering the matter more seriously than the public realize. A great deal of work is being done quietly in pushing the scheme, and there are indications, the secretary adds, that the general public, as well as the naval and military authorities, are being aroused to the necessity for the construction of the waterway.

The proposal of the association is that the canal should start a little west of Grangemouth, pass through the valleys of the Forth and the Endrick, and into Loch Lomond, close to Ben Lomond. After passing through the loch to Arrochar, there would be a short cut to Loch Long, through which ships would pass to the Firth of Clyde. The total

length would be 51 miles, of which only 30 would entail cutting. Another plan is that the line of the present Forth and Clyde Canal should be followed. This would bring the traffic nearer Glasgow, the western end would be further up the Clyde, and there would be better access to the Clyde shipyards for naval repair purposes, but the advantages of Loch Lomond as an absolutely safe naval base would not be available.

COMPETENT OPERATORS FOR MARINE OIL ENGINES.

A POINT which owners of motor coasters and barges would do well to note is the necessity of having competent mechanics driving their vessels; not merely men who are accustomed to the small marine steam set, but men who are thoroughly familiar with the working of the low-compression residual oil engine or semi-Diesel. An experienced hand can, after a little study, drive a petrol engine to give satisfaction, also with low-powered paraffin machinery of a good class, trouble is seldom experienced by the amateur; but when one comes to a sea-going cargo boat, which is running constantly, the engines often being kept going from two to three days at a stretch under severe conditions, things are different. When a pleasure vessel breaks down in sheltered waters, she either sets sail for a port close by or is towed in by another craft of the same fleet, time is lost, but little expense is incurred. When a sea-going boat's engines, however, give out on a channel passage it means, all too frequently, a salvage job, and then a few hundred pounds come out of the pockets of the owner or the underwriters.

Recently, several cases have come under notice, of mishaps to heavy oil-engined trading boats, and in almost all of them, investigation has shown that the trouble was want of lubrication brought about by the ignorance of those in charge. The main bearings of most of the present-day engines are lubricated by gravity-feed or pressure, and all that is required of the engineer is to keep the lubricator full. Some times, however, even this little attention is not given, with the result that the bearings are burnt out and the engines disabled. To sum up, the engineer of a 100 h.p. or 150 h.p. oil engine has so little to do that unless he is an experienced hand, and realizes the seriousness of the work, he is inclined to neglect it altogether. In a steam job there is not the same risk, as there is a deal of hand lubrication, and the engineer is kept at it throughout the watch.

Some time ago a motor coaster was picked up disabled in the Irish Channel and towed to port, the claim for salvage being $2,500. Her engines are of a most reliable make, and rank with anything on the market, and the breakdown occurred solely through the mechanic in charge, who, by the way, had experience only of small steam engines, allowing the lubricator to run dry, resulting in the burning out of the main bearings. Owners, of course, say that it is difficult at times to get a reliable man for a coaster's engine room. Certainly to some extent this is true; but generally speaking, the makers of the engine have a mechanic by them willing to take on the job, who has had some practical experience in their shops. It is indeed most unwise to employ in the engine room of a sea-going motor vessel men who are not thoroughly conversant with the engine which they are driving.

CULEBRA CUT, PANAMA CANAL.

IN the Culebra cut of the Panama Canal, the greatest engineering task ever undertaken, nine miles long and 587 feet deep, it is found that the rock is of the nature that after exposure to the air, it crumbles into dust, and worse than that, the sides of the hill are on the slide into the cut.

In August Blackwood's Magazine, Charles Paxton Markham has written a descriptive article on the Panama Canal, which sounds a warning note.

According to Mr. Markham the whole of the canal calls for the excavation of 182 millions of cubic yards, of which 52 millions still remain in the big cut, against which the whole force is concentrated, and in which connection, he says: "With a depth of cutting so vast it will be readily understood that difficulties should be experienced with the slopes. The deeper the cutting, the more accentuated does this become, because great slips are continually pouring down into the bottom, and the ground is developing deep cracks a mile away, showing that the whole of the hills are on the slide. How deep these cracks may go, or how far back, is a matter of conjecture, but all are terribly afraid of the serious nature of the trouble that lies at this point.

Steam shovels are now taking the tops off the hills so as to relieve the pressure as far as possible in the bottom, but so far with little or no useful effect. There are soft layers of clay, which allow the rock to slide. There are also one or two huge faults which break up and disintegrate the measures. Time will prove the truth or falsehood of the numerous theories abroad, but for many years it is extremely doubtful if the canal can be kept open without constant dredging and expense, and it is very probable that the cutting will be nearly five miles across at the top before the sides cease to run in, if ever they do, for the rock in the bottom cut of all turns to mud in a short time when in contact with water, and the wash of the propellers will suck this mud away."

If the above uotation says anything, it says the sides of the cut will slide, and are sliding. It suggests that the sides may come on in a rush, that is the whole mountain may come after the manner of slides which are described, as follows:

The slides take place without any warning, but so far, few lives have been actually lost though many narrow escapes have been experienced.

PEOPLE PAY INSURANCE LOSSES.

THE London Times of August 20, remarks that the question of forming a Canadian Lloyd's is viewed with sympathy by British underwriters, who are not at all alarmed at the proposal.

There is a feeling that slight resentment is to be found at the suggestion that the underwriting community should not have made itself acquainted with the improvements effected in the St. Lawrence, and that consequently it should be treating vessels using the St. Lawrence route unfairly, by quoting higher rates than for vessels engaged in trade with United States ports.

There certainly appears to be no conceivable reason why the underwriters should desire to penalize the Canadian route for the advancement of the other. Rather, all their natural sympathies would incline them to take the opposite course, were such possible.

The underwriters recognize the fact that the Dominion Government may be quite justified, from the broad motive of encouraging Canadian industries, in forwarding the establishment of a Canadian Lloyd's; but they maintain that if such an institution be started with the object of cutting the present rates, the losses that must inevitably follow would have to be met by the Canadian people.

C. G. S. "BAYFIELD" AT TORONTO FOR REPAIRS.

THE arrival of the Government steamer Bayfield in Toronto for the first time this season was hailed with approval by all of those interested in the development of Toronto as a port, for the vessel has put in for repairs and will be tied up at Polson's yards for the next week or ten days while her boilers are being overhauled and the hull generally put in shape for the winter. The steamer, which was built in Scotland, has

been engaged all summer in topographical survey work along the shores of Lake Ontario, with a view to correcting existing charts and obtaining a thorough knowledge of the shoals and currents within Canadian waters.

Quite an energetic spectacle is presented at Polson's at the present time, for in addition to the overhauling of the Bayfield, which has created still more activity, the company is engaged on the construction of two steel tugs for the Government. One fifty-five footer, under orders from the Department of Railways and Canals, is fast approaching completion and will take the water within the next fortnight, and be commissioned before the end of next month, when she will leave for Sault Ste. Marie. The hull of this little craft has been strongly reinforced, as in addition to her daily duties as a Government tug, she is intended to act as an ice-breaker in the Soo Canal during the early winter so that this connecting link between Lakes Superior and Huron can be kept open for traffic until the last possible moment.

The other tug is considerably larger having a water line of eighty feet, and although she does not actually mark a new departure in marine construction, craft of her type are not often built on Lake Ontario, for she is an ocean-going tug intended for service along the sea coast of Nova Scotia in connection with the Department of Public Works. She is an all steel craft and will be fitted with very powerful engines.

SCOTTISH SHIPBUILDING

SCOTTISH shipbuilding yards continue busy, especially those of the Clyde. There has been a slight falling off in the placing of contracts for new work, but there is no decrease in the regular output of tonnage, and but for the danger of labor troubles there would be very good prospects of record figures for the present year. Up to date, the Clyde total is about 3500 tons larger than that of the previous best figures for the corresponding eight months, while all the yards are practically full up with orders.

Eight Months' Work.

The following table shows the work of the eight months in all the Scottish shipbuilding districts:—

	Clyde.		Forth.		Tay.		Dee.	
	Ves.	Tons	Ves.	Tons	Ves.	Tons	Ves.	Tons
Jan.	18	[illegible]	1	1,085	2	1,250	2	410
Feb.	18	43,609	2	700	1	1,449	6	1,099
[illegible]	[illegible]	[illegible]	1	740	1	200	4	610
[illegible]	[illegible]	[illegible]	1	750	2	920	8	905
[illegible]	[illegible]	[illegible]	3	960	.	...	7	1,720
[illegible]	[illegible]	[illegible]	.	...	2	2,600	7	730
[illegible]	[illegible]	[illegible]	4	1,730	1	2,400	4	800
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1,200	5	500
	189	417,551	16	9,115	10	10,010	43	6,814

Owing largely to the launching recently of the large liners Niagara and Empress of Russia, at Clydebank and Fairfield respectively, the Clyde figures for August are easily the largest on record for the month. They are in fact just about double the August average, and, in addition, they bring the work of the year up to a total of 189 vessels of 417,551 tons. This is the second best on record, being exceeded only by that of 1907, which was larger by only about 3500 tons. The following are the Clyde figures since 1880:—

Year.	August. Tons.	Eight Months. Tons.	Year.	August. Tons.	Eight Months Tons.
1912	87,599	417,551	1895	35,544	227,687
1911	38,372	382,590	1894	33,494	208,265
1910	41,322	295,686	1893	24,278	174,999
1909	43,631	222,458	1892	17,059	235,991
1908	48,002	223,901	1891	15,793	196,467
1907	51,387	421,083	1890	30,113	223,173
1906	49,525	415,911	1889	36,103	198,695
1905	58,055	314,097	1888	29,339	148,533
1904	30,136	250,368	1887	36,556	129,580
1903	69,018	272,717	1886	10,121	112,495
1902	45,543	309,242	1885	13,693	117,508
1901	53,580	330,126	1884	25,762	183,299
1900	32,955	293,950	1883	34,032	261,573
1899	36,750	289,755	1882	27,940	222,094
1898	28,850	249,608	1881	31,120	213,042
1897	30,492	193,216	1880	17,982	148,720
1896	20,388	240,216			

BRITAIN'S NEW BATTLESHIPS.

IT is stated that immediately after the Super-Dreadnought battleship Iron Duke now building at Portsmouth, is named and launched by the Duchess of Wellington on October 12, the building slip will be prepared for laying down another ship. This, it is understood, will be of even larger dimensions than the Iron Duke, and there is reason to believe that the new vessel will have so many modifications and improvements that she will virtually mark the commencement of a class superior even to the Super-Dreadnoughts now completing.

Not only gun positions but broad funnel openings leading to furnaces and engine rooms are to be screened against the danger of dropped bombs, and steps may also be taken to give better protection against aerial attack in the case of vessels completing and already in commission.

LARGE FLOATING DOCKS.

OWING to the recent departure of two large floating docks from shipyards at Barrow and Birkenhead for Montreal and Portsmouth respectively, there has been aroused a good deal of public interest in floating docks. Much confusion as to the size of these docks has arisen, one of them having been described as the largest in the world. This however, is not correct. The new floating dock at Portsmouth is of just the same size and design as that built by Messrs. Swan, Hunter and Wigham Richardson, Ltd., Wallsend, for the British Admiralty, and sent to the River Medway this summer. These twin floating docks designed to lift battleships up to 32,000 tons displacement, are the largest yet built or owned in Great Britain, but still larger are the 40,000 ton floating docks owned by the German Government at Kiel, and the 35,000-ton dock belonging to Messrs. Blohm and Voss, at Hamburg.

Dock.	Lifting capacity.	Leng Ft.
Kiel	40,000	656
Hamburg	35,000	720
Medway	32,000	680
Portsmouth	32,000	680
Montreal	25,000	600
Hamburg	25,000	525
Pola	22,500	584
Rio de Janeiro	22,000	550
Hamburg	20,000	511

th.	Clear width.	Depth Over keel blocks.	Owners.
	154	35¼	German Government
	108½	33	Blohm and Voss
	113	36	British Admiralty
	113	36	British Admiralty
	100	27½	Canadian Vickers, Ltd.
¾	108½	33	Vulcan Company
¾	111½	37	Austro-Hungarian Govt.
	100	30	Brazilian Government
¼	97	26	Reiherstieg Company

DIESEL-ENGINED SHIP WITH ELECTRICAL TRANSMISSION.

WE understand that a vessel, the propulsive machinery of which embodies Diesel engines and an electrical transmission system, is at present being constructed by Swan, Hunter and Wigham Richardson, Limited, of Wallsend-on-Tyne. This vessel will have a deadweight capacity of 2400 tons gross on a draught of 14 feet., and is being built to the order of the Montreal Transportation Company, for service on the Canadian canals and lakes. The propulsive machinery is to consist of two sets of Diesel engines, each of 300 horsepower and running at 400 revolutions per minute. Each engine will be coupled to an alternating current generator with exciter, and on the propeller shaft there will be fitted a compound-wound squirrel-cage induction motor capable of turning the propeller at a normal speed of 80 revolutions per minute. The system of transmission is that proposed by Mr. H. A. Mavor, of Mavor and Coulson, Limited, Glasgow. It has already been experimented with in a small vessel known as the Electric Arc. The chief claim for the new vessel seems to be that without an increase of overall dimensions her capacity, by reason of the decreased weight of the machinery, is increased by about 200 tons.

Montreal.—Montreal's new dry dock is now more than half way across the Atlantic. A Marconigram to this effect was received at the offices of the Canadian Vickers Co. on the afternoon of September 19. The dock was then somewhere off the Azores. Following is the message received: "Position noon, Tuesday, 115 miles east-north-east Yayal, all well."

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ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals who Have Been More or Less Prominent in the Marine Sphere

Mr. George McL. Brown, European manager, represented the C.P.R. at the launch of their new Pacific liner, Empress of Russia.

Alex. Oberlie, land steward of the C.P.R., at Port McNicoll, has resigned to take charge of the estate of Frank Oberlie, Formosa.

Mr. Samuel Hewitt, traveling passenger and freight agent for the Northern Navigation Company in the Toronto and Western Ontario Territory, died recently at his home, Ste. Marie Street, Collingwood, in his 60th year.

Mrs. H. Wyndham Beauclerk, eldest daughter of Sir Thomas G. Shaughnessy, K.C.V.O., gracefully performed the launching ceremony of the new C.P.R. liner Empress of Russia, from the yard of the Fairfield Shipbuilding & Engineering Co., at Glasgow, on August 28. Mrs. Beauclerk was made the recipient at Mr. Gracie's hands of a souvenir in the shape of a chalice of antique design, together with a diamond and emerald brooch.

Captain Lugar, of Halifax, Dominion Government Examiner of Masters and Mates, recently conducted an examination for examiner of masters and mates. Owing to the frequency of marine accidents, the Department of Marine and Fisheries have ordered that masters and mates must in the future possess first-class certificates, and have made the examinations severe.

NEW SURVEY STEAMSHIP.

A NEW survey steamship for the hydrographic department of the Canadian Government, which has been ordered from Messrs. Swan, Hunter, and Wigham Richardson (Limited), of Wallsend-on Tyne, will be similar in many respects to the survey steamer Cartier, delivered by the same builders to the Canadian Government two and a half years ago, which is 173 ft. 6 in. long, 29 ft. 1½ in. broad, and 15 ft. deep, and has a service speed of 11½ knots. Instead of being a twin-screw ship like the Cartier, the new vessel will have a triple-expansion engine driving a single screw.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont., Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street ,Kingston, Ont.; Captain T. J. Murphy, 111 William St., Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy St., Kingston, Ont.; Captain James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rideau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.

President—James Playfair, Midland; Counsel—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.

Chairman—W. F. Wasley, Gravenhurst, Ont.
Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.

President—A. A. Heard, Albany, N.Y.
Secretary—M. R. Nelson, New York. .. ....

THE SHIPPING FEDERATION OF CANADA

President—A. A. Allan, Montreal; Manager and Secretary—T. Robb, 526 Board of Trade, Montreal.

SHIP MASTERS' ASSOCIATION OF CANADA.

Grand Master—Capt. J. H. McMaugh, Toronto, Ont.; Grand Secretary-Treasurer—Capt. H. O. Jackson, 376 Huron St., Toronto.

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Thos. Theriault, Levis, P.Q., Grand Vice-President.
Neil J. Morrison, P.O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
Jno. A. Murphy, Midland, Ont., Grand Conductor.
George Bourret, Sorel, P. Q., Grand Doorkeeper.
Richard McLaren, Owen Sound, Ont.
L. B. Cronk, Windsor, Ont.
Grand Auditors.

ALLAN-C. P. R. STEAMSHIPS MERGER.

THE retirement of Sir H. Montague Allan has led to discussion in shipping circles as to whether the C. P. R. will openly absorb the administration of the Allan Line. Seeing how closely they now co-operate, it is doubted whether the present arrangement is not more convenient for the companies and the public. The two new Allan 17,000 ton turbiners, which will be ready for next season, should, in conjunction with two new C. P. R. 15,000 ton turbiners on the Pacific, place the joint through service in a position to command the complete co-operation of the British and Canadian Governments for mails and admiralty purposes.

FEATURES OF LOCK GATE CONSTRUCTION, PANAMA CANAL.

IN connection with the mitering lock gates, a somewhat novel device has lately been adopted in order to insure a tight fit between the bottom of the gates and the fixed sills on the masonry. The original plans provided for a heavy timber to be fixed to the masonry and a similar timber fastened along the bottom of the gate leaf. In normal operation, when the gate is closed these two sills should be in contact. Owing to changes in temperatures and consequent slight variations in the lengths of the gate leaves, it is possible that an absolute fit of one timber against the other will not at all times be maintained. This may also arise from slight changes in the operation of the machinery.

Directory of Subordinate Councils for 1912.

Name	No.	President.	Address.	Secretary.	Address.
[illegible]	1	A. J. Fisher,	490 Concord Ave.	E. A. Prince,	61 Elm Grove, Toronto.
St. John,	2	J. F. Matthews,	50 Douglas Ave.,	G. T. G. Blewett,	65 Harrison St., St. John, N.B.
Collingwood,	3	Andrew Kerr,	Box 343, Collingwood,	Robert McQuade,	P.O. Box 97, Collingwood,
Kingston,	4	A. E. Kennedy,	395 Johnston Street,	James Gillie,	101 Clergy St., Kingston, Ont.
Montreal,	5	A. F. Hamelin,	3208 Le Tang Street,	O. L. Marchand,	St. Vincent de Paul, P.Q.
Victoria,	6	Alex McNivern,	P. O. Box 234,	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver,	7	A. S. DeGruchy,	Room 23, Williams Bldg.,	E. Read,	859 Thurlow St.
Levis,	8	Helaire Mercier,	Bienville, Levis,	Jules Lecours,	Bienville, Levis, P.Q.
Sorel,	9	Geo. Bourret,	Sorel, P.Q.,	Al. Charbonneau,	P.O. Box 132, Sorel, P.Q.
Owen Sound,	10	H. W. Fletcher,	636 4th Ave. East,	E. J. Riley,	1030 1st Ave., Owen Sound, Ont.
Windsor,	11	Alex McDonald,	Windsor, Ont.,	Neil Maitland,	221 London St. W., Windsor, Ont.
Midland,	12	Jno. Scarthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
Halifax,	13	D. J. Murray,	Victoria Rd., Dartmouth,	Chas. E. Pearce,	Portland Street, Dartmouth, N.S.
Sault Ste Marie,	14	Thos. O'Reilly,	Sault Ste Marie,	Geo. S. Biggar,	Sault Ste Marie, Ont.
Charlottetown,	15	J. K. Sutherland	Charlottetown, P.E.I.,	Lem Winchester.	302 Fitzroy St., Charlottet'n, P.E.I.

Without making any changes in the timbers as originally specified, a sill consisting of a rubber flap four inches wide and one-half inch thick, and fastened to the gate by an angle iron has been added. This seal will at all times fit closely, even though there be a slight gap between the fixed sill and the leaf. Experiments made at the Gorgona shops seem to indicate that the design will fulfill its purpose perfectly.

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—⚙—

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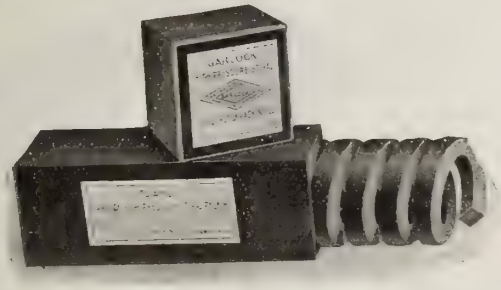
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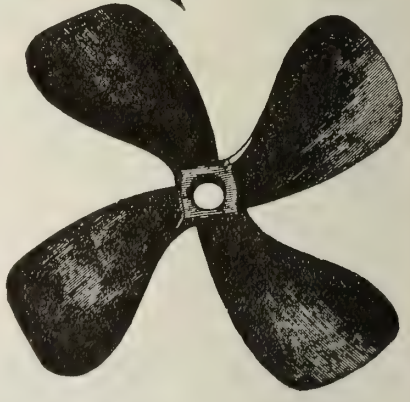
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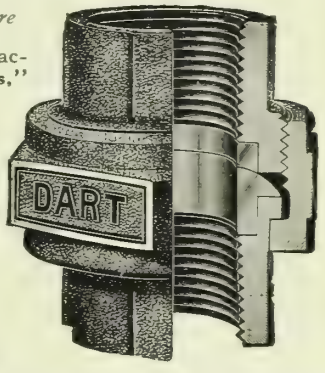
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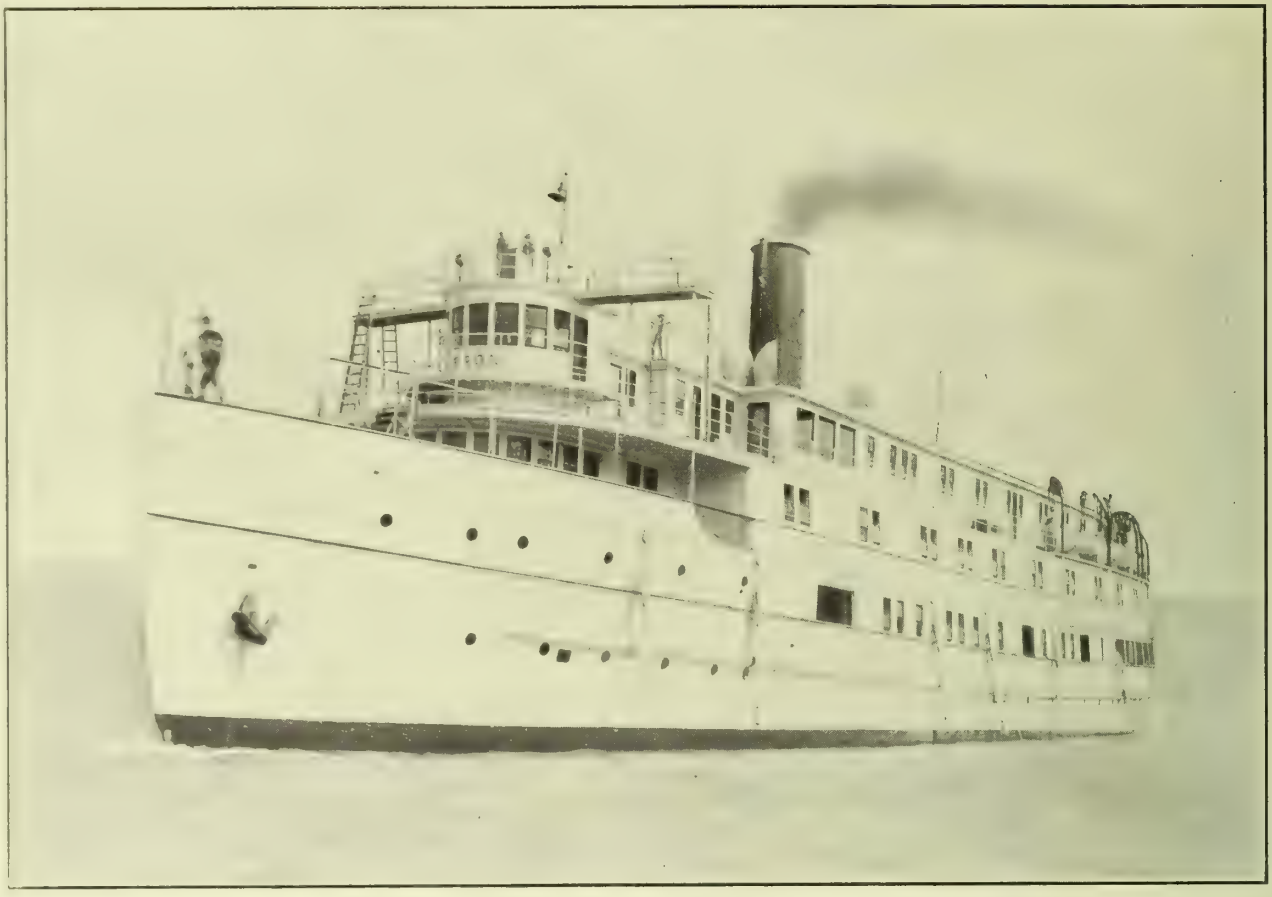
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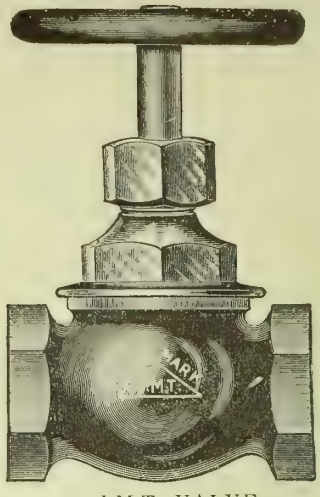


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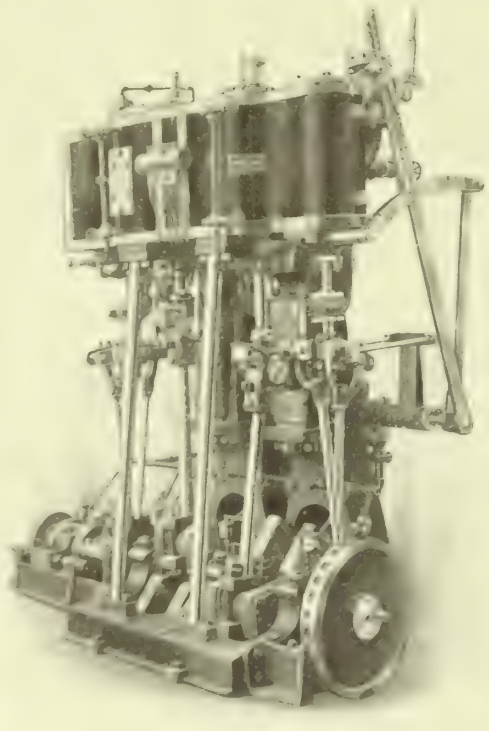
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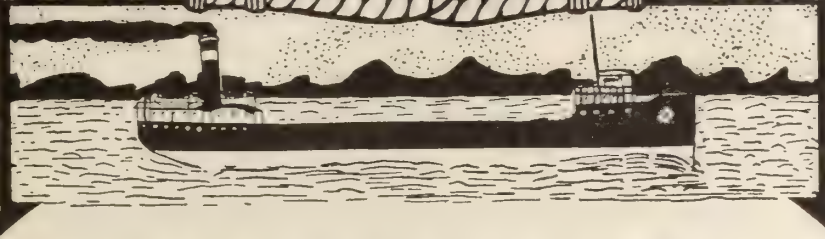
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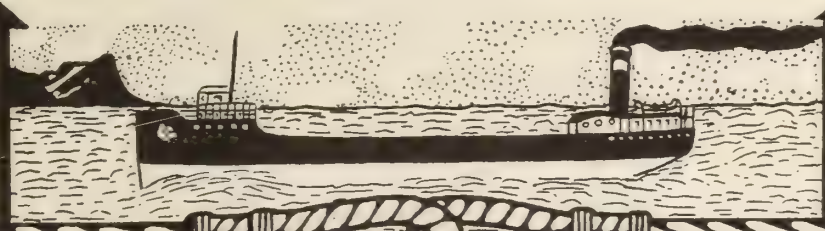
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Keystone Transportation Company's Steamer "Keybell"

By C. T. D.

It will be noted from the data concerning this latest addition to the fleet of Great Lake's freighters, that Canada's leading shipbuilding and marine engineering plant at Collingwood, Ont., is keeping pace with the world progress being made in every feature of naval architectural achievement.

THERE was recently completed at the yards of the builders—the Collingwood Shipbuilding Co., Ltd., Collingwood, Ont.—the bulk-freight steamer Keybell, of full Canadian canal dimensions, built to the order of the Keystone Transportation Co. of Canada, Ltd., Montreal. The contract was signed for this vessel on April 4, the launch took place on September 17, and the vessel was turned over to her owners on October 12, this being a very creditable showing, considering the great difficulty in getting the steel, on short notice, to build the hull, due to the fact that the American mills were inundated with previous orders for material. The vessel is of excellent model for its particular service, and is built, under inspection, to class to the British Corporation for the Survey and Registry of Shipping, for Great Lakes and Atlantic Coast Service; Captain James B. Foote, of Toronto, being the society's local representative. The carrying capacity of the vessel on canal draft of 14 ft. 6 in. is approximately 85,000 bushels; her length overall, 258 ft.; length B.P., 244 ft.; breadth moulded, 42 ft. 6 in.; depth moulded, 20 ft. She is of the single deck, bulk-freight class for coal and grain cargoes, and is intended principally for the coal trade between Erie, Pa., and Montreal, Que., while occasional trips will be made down the coast to Sydney, N.S.

Constructional Features.

The vessel is built on the arch and web frame system, which dispenses with pillars and leaves the holds unobstructed, thereby facilitating the handling of bulk cargoes of coal and ore with clam-shell unloaders. The arches and webs are spaced at 24 ft. centres, the arch plate being 30 inches deep of 15-lb. plate, connected to web frame of same weight, 22 inches deep, with large bracket at tank margin. These with the deep floor plate in double bottom form a belt frame around the ship; the arches, being connected to the main deck plating by large brackets, also support the main deck beams, making ample provision for heavy deck loads of pulpwood. The regular framing, between the webs, consists of solid 13-lb. plate floors in double bottom, spaced at 4 ft., with intermediate angle floor frame and reverse on alternate frames, and side frames 7 inches by 18 lbs. channel spaced at 2 ft. well bracketed to tank margin and to main deck beams of same section and spacing, to take the strains incident to canalling. The frames for 40 ft. from the stem are spaced at 18 inches centres, which, with the numerous panting beams and the panting stringers, afford additional protection to the hull against ice damage.

The bottom framing is supported longitudinally by three lines of 13 lbs. plate intercostals, and the side framing by three lines of side stringers composed of channel bars intercostalled to shell. The bottom shell and the tank top plating is exceptionally heavy for a vessel of this size, being a margin against bottom damage on full canal draft and damage to the double bottom plating by the heavy grab buckets now in use. The tank margin at its junction with the shell is below the level of the tank top, providing a capacious bilge well, into which the bilge suctions are fitted. This provides against leakage, from damage to the side shell finding its way into the cargo holds when the vessel is in the locks, the bilge ceiling being fitted watertight. The forward hold, which is most liable to this sort of damage, has been equipped with a grain ceiling as a protection against moisture, this being fitted in hatches and arranged by an ingenious system of bolting, to be easily removable for inspection and painting of the adjacent steel work.

Five bulkheads are fitted, three watertight and three screen, the cargo hold being divided into three sections. An



KEYSTONE TRANSPORTATION CO. STEAMSHIP "KEYBELL"

additional partition bulkhead is fitted between the boiler and machinery spaces. All deck houses, machinery casings and the engine skylight are steel, the deck over the after house being extended to shelter main deck. The stem, stern frame and rudder frame are of wrought steel, the stern frame being scarphed below the boss to facilitate repairs in case of damage to the shoe, the scantlings of the latter are also very heavy. The rudder is of the side plate type, with counterbalance, coupled to the head below counter, the coupling being designed to permit of unshipping the rudder without disturbing the steering gear keyed to the stock above.

The machinery is located right aft, the engine being bedded on the tank top, and the scantlings of the double bottom increased in way of engine bed to afford rigid foundation to same and distribute the strain. The boilers are also placed on the tank top with firehold at forward end. The bunkers, with capacity for 140 tons of coal, are located on the main deck over the boilers, and are arranged to coal from spouts through hatch in cabin deck, with saddle-back chute into the pocket bunkers at each side of firehold. A second deck is fitted for a short distance aft, the starting platform, from which the main engines are handled, being at the same level, with the engineers' store and tool rooms at after end of machinery space.

Watertight scuttles are fitted in the main deck, over cargo bulkheads, with Jacob's ladder to holds, and a wrecking well of steel plate fitted in two of the holds. Five cargo hatches, each 28 ft. 6 in. by 12 ft. spaced 24 ft. centres, and the after hatch 28 ft. 6 in. by 20 ft., afford ample facilities for the rapid handling of cargo. The hatch covers are of 3-inch Norway pine, supported by strongbacks and fore and afters of rock elm, and are provided with double tarpaulins of waterproof canvas. There are two steel masts, having one cargo derrick fitted to the fore and two to the main mast, of three tons capacity, with cargo whips led to 6 in. by 8 in. single drum hoisting winches of Collingwood Shipbuilding Co.'s design; the running gear being of flexible crucible steel wire in B. & L. blocks. A fender of 11 in. by 9 in. rock elm is fitted the full length of the ship, just above the load line, and another of same scantlings around the stern at main deck level. The double bottom is divided by watertight cross divisions and watertight centre keelson into seven compartments for water ballast, these with the fore and after peaks totalling 990 tons.

Piping Arrangements.

The ballast pumping arrangements consists of a 9 in. by 10 in. by 10 in. duplex vertical ballast pump placed in the lower engine room on port side of ship, piped to pump, through manifold placed at forward end of engine room, into or out of each compartment of the double bottom, the suction to each being a 5 in. wrought iron pipe. A bilge pump on the main engines is connected up to a special bilge manifold having 2½ in. suction to bilge wells in each hold and in boiler space. A 6 in. flood valve is fitted in the tank top in forehold for the purpose of flooding or draining the hold. There are also two 6 in. hold drains located in No. 3 hold to draw from off the tank top in the cargo space and connected to main ballast manifold. The plumbing system throughout the vessel is supplied by a 4 in. by 4 in. by 5 in. horizontal duplex sanitary pump in the engine room, three large fresh water storage tanks being connected to this line for use in port, affording an ample supply of pure water at all times.

An Emerson-Walker patent quick-warping, direct-grip windlass is installed on the forecastle head, the ground tackle consisting of two 36 cwt. Bower anchors, one stream and one kedge anchor—all Sykes Britannic Stockless, with chain cables and steel wire hawsers to requirements of the British Corporation. The Bower anchors are arranged to stow in anchor pockets, entirely within the hull. The deck machinery, in addition to the hoisting winches already mentioned, consists of two mooring machines, by the builders—one 8 in. by 10 in. double drum placed on main deck amidships and one 6 in. by 8 in. single drum right aft on the main deck, the chocks and other accessories being arranged about as usual in canal steamers.



KEYSTONE TRANSPORTATION CO. STEAMSHIP "KEYBELL"

Ship Handling Machinery.

The steering gear was supplied by Messrs. John Hastie & Co., Greenock, the engine being placed aft on lower deck adjacent to the engine room and direct connected to the quadrant, which is on the Wilson-Pirrie principle. The gear is controlled from stands in pilot house and on bridge by wire rope transmission. A hand gear, with two large teak wheels, is fitted at after end of cabin deck to control the vessel in an emergency, the forward gear being thrown out by means of a clutch. A spare tiller and relieving tackles are also supplied, connected to rudder head above main deck.

A steel snubbing cable is fitted with reel on forecastle head, controlled by an Angrove cable compressor, for warping in the locks. The spars consist of a spear pole at stem head and flag poles forward and aft. The outfit includes two 22 ft. Watts metallic lifeboats, equipped with Huff's patent disengaging hooks, placed on cabin deck under davits arranged to travel transversely, with links and guides, which permit of more rapid handling than by means of swinging davits. It also avoids placing davits and boat skids close to rail, where they are always liable to damage when lying alongside docks or other vessels. A complete outfit of life saving apparatus, fire hose, etc., to pass Government inspection, has been supplied, also awnings over pilot house, over main deck forward and over crews' quarters aft, oil and electric signal lamps, cabin lamps, navigating in-

struments, flags, mate's and carpenter's stores and cooperage.

Cabin Arrangement.

The accommodation for officers, owners and crew is of a superior class, the after part containing galley, pantry, refrigerator and crews' mess, dining-room, quarters for chief and second engineer, steward and oilers and firemen. The dining-room is panelled in oak, with panelled pine ceiling. The officers' rooms are finished in birch. The floor of galley is of cement, while wood floors covered with linoleum are fitted in living rooms. Trunk skylights are fitted over dining-room and galley, and screens are provided for all doors and windows. The quarters forward under forecastle deck contain, on the port side, mates', wheelsmen's, deckhands' and watchmen's rooms, store and officers' bath and crews' hall. On the starboard side are the owners' quarters, consisting of a sitting room entered from main deck, two staterooms and bath. Above this, on the forecastle head, is the Texas containing captain's office, stateroom and bath, and forward of this, a handsome observation room for the owners' use. The captain's and owners' rooms and the observation room are half panelled in birch of mahogany finish, with V.G. wainscot of wide base and chair rail below. The ceiling is panelled in pine, painted flat white, making a rather attractive finish. Above the Texas is the pilot house, arranged particularly for canal service. This is of ample proportions and contains a good area of glass, thereby providing for the navigation of the vessel from the inside. The engine and docking telegraphs are placed here. Speaking tubes lead from the pilot house to deck over and to captain's room. The plumbing and heating installation is of the best class, being, in every particular, ample for the service. Running hot water is provided in the galley, captain's and owners' quarters and for crews' shower.

Electrical Equipment.

The electrical installation consists of one 6 K.W. Holmes engine and dynamo, direct connected, placed on running deck in engine room on port side of ship. The equipment consists of about 100 lights, with conduit installation throughout the holds and engine room, all to the requirements of the British Corporation. On deck there are eight positions for portable lights, for working cargo by night, also plugs placed right forward and aft for convenience in taking drafts. Ample light is provided in the holds by means of four lamps at each cargo hatch, placed close on deck, well out of the way. The forward end is controlled by an eight circuit panel box, fitted in crews' hall, and the after end by another eight circuit panel box located in stairway to engine room. Electric tell-tales fitted in pilot house indicate when the navigation lights fail. Running lights, telegraphs and binnacles are fitted for both oil and electric light. The whole installation has been carefully laid out to insure ample illumination in all rooms, and also to include the exterior of the deck houses and the machinery space.

Cabin Furnishings.

The furniture and fittings of the cabins are about as follows: The dining-room is done in oak, natural finish, the sideboards being particularly handsome and in keeping with the general character of the room. Ample accommodation is provided for eight officers at the massive oak table and by richly constructed leather upholstered chairs. The floor is of linoleum tile of unique pattern. The chief engineer's stateroom is in mahogany finish, has rich deep leather upholstered settee with berth hangings and window curtains of heavy double velour, blending well with the rich moss green carpet. The captain's cabin of mahogany finish, with furniture to match, has heavy double velour berth and window curtains. The captain's office is supplied with roll top desk and settee upholstered in leather, the floor being laid with linoleum tile.

Observation Room.

The furniture of this room is of reed, presenting an airy and restful appearance. The easy chairs, table, etc., are finished in a baronial brown tint which harmonizes effectually with the hangings and rich pile carpet of same shade.

En Suite and Special Quarters.

The owners' quarters, which are situated at the forward end of main deck, are furnished as follows: The sitting room, in mahogany finish, has richly upholstered lounge, Austrian furniture, convenient ladies' desk, etc., with rich dark green Brussels carpet and hangings to match. The two commodious staterooms opening from the sitting room are also in mahogany finish, which, together with the massive brush finished brass beds, draperies and rich carpeting of dark green shade, produce a most pleasing effect. The upholstery and entire steward's and cabin outfit for the vessel was supplied by the well-known outfitter H. F. Trott, of Collingwood.

Propelling Machinery.

The main engines are of vertical, triple expansion, surface condensing type, having 16, 26 and 44-inch diameter cylinders by 36-inch stroke. Edwards' air pump, feed and bilge pumps are direct connected to the main engines. The surface condenser, of cast iron, is embodied with the back columns in the design of the engine. There are two boilers 11 ft. 6 in. diameter by 10 ft. 6 in. long built for 180 lbs. working pressure and equipped with the Howden system of forced draft. The auxiliary machinery in the engine room consists of one 9 in. by 10 in. by 10 in. duplex vertical circulating pump, one 9 in. by 10 in. by 10 in. duplex vertical ballast pump, one 8 in. by 4 in. by 10 in. horizontal duplex auxiliary feed and fire pump, one 4 in. by 4 in. by 5 in. horizontal duplex sanitary pump and one 6 K.W. generating set direct connected to vertical engine for the electric light service of the ship.

The owners are represented by Messrs. John Reid & Co., naval architects, Montreal.

The vessel will be sailed by Captain J. J. Murray, late of S.S. Keyport with J. H. McMillan as chief engineer.

A POWERFUL SEARCHLIGHT.

THE most powerful searchlight ever carried on a merchant ship was a conspicuous feature of the Kaiserin Auguste Victoria, which arrived at New York recently, says the Scientific American. The great light, which is the largest of its kind ever constructed, is designed for the steamship Imperator. It is being carried back and forth across the Atlantic, for the purpose of thoroughly testing it at sea and on entering harbors. It throws a beam of light of 80,000 candlepower. On approaching port, the searchlight was turned on the Scotland Lightship, rendering the name of the ship clearly visible at a distance of several miles. The great light is effective for seven miles at sea, and when thrown upon the clouds is clearly visible for a distance of thirty miles.

The searchlight reached the vessel only three hours before her sailing and was carried on the forward deck. It will be installed on the lookout, high up on the mainmast, where it can be swung quickly to any angle. It is of the type used, heretofore, only on the largest Dreadnought battleships. The lens is 42 inches diameter. It is operated by a current of 13,000 watts on a 110-volt circuit. In actual tests at sea, the ray has pierced fogs and distinguished distant objects at every point of the horizon.

Montreal.—The Canadian Pacific Railway has arrived at an agreement with the owners of the collier Helvetia, which was sunk in the St. Lawrence by the Empress of Britain on July 27th last, and have paid them the sum of $309,000 as compensation.

Lighting the Paths of Canada's Merchant Marine

By Charles A. Bowman

The writer of this article features in a racy but interesting manner, the development and progress made in the matter of buoy, lighthouse and lightship provision on various danger spots in the navigable waters of Eastern Canada, and shows that the Government Department entrusted with the work of safeguarding our shipping is fully alive to its responsibilities.

TO have an intimate knowledge of Canada's vast waterways, one must voyage over the greatest stretch of navigable water held by any particular nation. Canada's coasts, with their magnificent harbors, her lakes and rivers and channels, go to form the basis of what may ultimately be the centre of the of the world's merchant shipping; for while yet only in its infancy, each year the volume of inland and ocean traffic increases. Immense canal and dock schemes are under way. Established shipping lines grow larger, and new navigation companies are steadily being floated. With coal and minerals in abundance, shipbuilding is forging ahead, in an effort to keep pace with Canada's ever-expanding wheat belt. The Dominion's destiny being clearly



HEATH POINT, ANTICOSTI
In Process of Construction

mapped out as the granary of the British Empire and wheat-grower to the world. the necessity of keeping our great highways of commerce well and truly lighted and defined, becomes apparent to all.

Ocean Lighthouses.

To ensure safe navigation so that the sailor may steer his vessel in perfect security out of the harbors and rivers, upon its voyage over "Old Ocean's grey and melancholy waste," many interesting devices are in operation. Perhaps the best known of those aids to navigation is the lighthouse. The saying that "knowledge is power" is splendidly illustrated by the lighthouse, as it stands often half buried in surge, converting hidden dangers into sources of safety, so that the sailor now steers for those very rocks which he formerly dreaded and took so much care to avoid.

Canada is a land of such immense distances, that one does not always realize the magnitude of her national undertakings; but a glance over the official blue-book, issued by the Marine Department, will provide food for thought. The lighthouse service has an army of about twelve hundred keepers—giving all their attention to nearly twenty-five hundred lights. To give a fanciful idea of the



MARTIN RIVER, GASPE
Showing the Old and the New

wonderful illuminating power they develop, Canada's lighthouses could form a complete chain of signals around the world. Were they so placed, equator-fashion, it would be possible for a citizen of Canada to travel around the globe and never be out of the range of some Canadian lighting or signalling station, and the sun would never set on the Dominion's aids to navigation! Surely if the attempt is ever made to signal to Mars, Canada, with her grand aggregation of lights, varying from small fifty candle-power beacons to great flashes of one hundred-and-eighty thousand (180,000) candle-power, should cause the Martians to blink.



GANNET ROCK LIGHT
Located at the Entrance to the Bay of Fundy

Many Canadians, and visitors from all parts of the world, look forward each year to the delightful pleasure cruises which our coasts and lakes and rivers afford. Sailing along on a gentle ocean swell, with sun smiling down on the trim green lawn around a white tower, it is difficult to imagine the same lighthouse storm-swept and threatened by the violence of a raging ocean; yet many of them have to bravely front the elements and battle with wind and wave in their most awe-inspiring moods.

These towers have to be built strong enough to withstand powers of nature which are subject to no calculation. When the Atlantic lashes itself into a



BELLE ISLE LIGHTHOUSE.
470 Feet Above High Water

fury, great waves, even forty-three feet high and measuring five hundred-and-sixty feet from crest to crest, hurl themselves upon the exposed lighthouse at intervals of sixteen seconds, with a velocity of thirty-two miles per hour. The force exerted by some of these waves is almost incredible. A mass of stone, nearly three tons weight, has been thrown from the top of a cliff eighty-four feet above the sea. On one occasion when a heavy jet of water struck the lighthouse tower, a 60-gallon cask, full of rain-water (weighing about 672 lbs.' was burst from its lashings on the balcony, at a height of one hundred and fifty feet above the sea.

Huge blocks of thirteen tons have been quarried out of the rock by the waves at a level of seventy-four feet above the sea. The greatest force known to be exerted by waves occurred at a breakwater in Scotland when, during a storm a monolithic mass of concrete weighing 1,350 tons was moved bodily from its position, and on a later occasion, a mass of no less than 2,600 tons

was displaced and moved inwards in a similar manner. In both of these instances, the foundations on which the mass rested were not in the least disturbed. Fortunately (or unfortunately, according to temperament) few of us ever have the opportunity of studying the lighthouse under such tempestuous conditions.

Shore Lighthouses.

Travelers are better acquainted with the picturesque lighthouses dotted along the lake-shores and rivers. Some of the inland stations are situated amongst most beautiful surroundings; such as the numerous lights among the Thousand Islands, where the St. Lawrence emerges from Lake Ontario, or those among the wonderful Thirty-Thousand Islands in the Georgian Bay. To be a lightkeeper amidst such peaceful scenery would surely appeal to the heart of a Wadsworth.

In many instances, the lightkeeper combines with his government service a little farming or fishing, to provide for himself and family. Only in exceptional cases are the wages of a lighthouse keeper high; seldom exceeding fifty dollars per month. When a station is situated near a farm or other dwelling, the light may only require small attention, and the farmer is usually willing to attend to it for five or ten dollars per month. The annual wage bill for all lightkeepers amounts to about $290,000. "Efficiency" is the watchword of the Lighthouse Service Administration. Each year, as the shipping trade of Canada increases, every cent well spent on lighthouse work means insurance in the highest form against loss. It prevents loss. At present Canada is spending $1,500,000 per annum on lighthouse construction, piers, etc., while those already in existence cost about $700,000 per year for maintenance. At extreme limits of the Dominion two powerfully equipped lighthouses have recently been erected. One on Little Hope Island off the Nova Scotia Coast; the other, three-thousand miles to the west, at Solander, B. C.



C.G.S. "SIMCOE"
Ready to Leave Prescott With Supplies for the Lighthouses



FAME POINT LIGHTHOUSE
An Important Beacon on the St. Lawrence Route



A GAS BUOY
Located off Halifax Harbor.

Windmill Point Light.

Travelers on the St. Lawrence pass a very interesting old lighthouse before

entering the rapids between Prescott and Montreal. It is known as the Windmill Point Light, and marks the scene of a fierce battle on November, 1838, when Von Schultz and his rebel army made their tragic last stand around the ancient windmill. Hard pressed by the Canadian defenders, the rebels took refuge in the windmill tower. The tower was stormed and the invaders clambered to the top closely pursued by the cruel bayonets of the Imperial troops. There, cornered like rats in a trap, some of the hunted wretches fell before their conquerors, while others with desperate courage leaped from the parapet in a vain effort to reach the river. Such a terrible jump, however, proved to be beyond human power, and not one escaped the rocks below. They were picked up mangled or dead at the foot of the tower. At a later date, when the Fenians invaded Canada, from Ogdensburg and Sackett's Harbor, an effort was made to capture the windmill, but the local troops repulsed them with great gallantry, and the Fenian Raid came to an inglorious termination. The windmill is now equipped with a modern acetylene light which may be seen after passing Brockville, ten miles above it.



CAPE FORCHU LIGHT
At the Land's End of Nova Scotia, Near Yarmouth.

Acetylene as an Illuminant.

Acetylene as an illuminant has been developed in Canada to a high point of efficiency. It is especially used in a particularly effective automatic buoy—invented by a Canadian, Thos. L. Willson, and manufactured in Canada by the International Marine Signal Co., Ottawa, This buoy, a veritable floating lighthouse, is charged with carbide of calcium and floated in the lake, river, ocean or wherever it may be situated. Water makes contact with the carbide through a hole in the submerged part of the buoy. When the gas has generated to a certain pressure the water is driven back and generation of gas is suspended until sufficient has been consumed to reduce the pressure and allow the water to once again make contact with the carbide—and so on until the charge of carbide is exhausted. One charge will suffice to keep the buoy working for five or six months without attention.

Travelers, or residents near Canadian shipping centres, may have noticed the floating buoy, as it flashes and extinguishes, every few seconds. The light is caused to flash by means of an ingenious device, termed an occulting apparatus, which cuts off and re-admits the supply of gas to the burner at the desired interval. A small "pilot burner," which is alight all the time, does the operation of relighting. For acetylene lights on land, the gas is usually supplied in large tanks from a generating station. Several maritime nations are copying the Canadian system, and acetylene buoys are being shipped to all parts of the world.



MACQUEREAU POINT LIGHT
3 Flashes Every 15 Seconds.

Coal Oil Illuminant.

A very powerful illuminant is obtained from petroleum (coal-oil) for the larger lighthouses. The oil is pumped to a vaporizer at a pressure of forty-five pounds per square inch, and then passed to an incandescent burner. The burner, with its incandescent mantles, may be equal to about fourteen-hundred candle-power, which, in itself, is not sufficiently bright. There are two methods of magnifying the light and projecting it as a beam in the desired direction. So long ago as A.D. 1763, experiments were made with a reflector to collect the rays of light from the burner and project them in a parallel beam. This is the original method, and the principal is still in favor for small lights, up to about thirty-thousand candle-power. The reflector is made of sheet copper with a bright silver-coated surface, and is so shaped that no matter at what angle the rays of light from the burner strike its surface, they are all reflected in a perfectly parallel line.



THE LIGHTHOUSE DEPOT AT PRESCOTT

At a later date a celebrated French mathematician, named Fresnel, devised a method whereby the light could be refracted through a lens, and this method, greatly improved, is now in universal use. The lens is not of solid form, such as we meet in telescopes, cameras, etc., but is built up in prismatic sections, with the burner in the centre. Lighthouse lenses can scarcely be compared with camera lenses. Some of the great lights, such as Belle Isle, on the Newfoundland Coast, are fitted with a lens of nine feet diameter. Although a light of this magnitude is only "officially" visible at twenty-eight miles, on a clear night it is possible to see it flashing seventy miles away.

The Revolving Flash.

To obtain a revolving flash the lighthouse is fitted with very accurately balanced driving mechanism. The lens is mounted upon a large cast-iron table of circular form, which, in turn, rests upon a hollow cast-iron float. The whole is caused to revolve by powerful clockwork; thus obtaining a revolving flash. The revolving parts may weigh two tons, but by floating the lens, table, etc., in a circular bath of mercury, instead of running on rollers or ball-bearings, very little effort is required to turn this mass.

All this revolving machinery may be at the top of a tower four hundred feet above sea level, and it must be very carefully guarded from the elements. It is entirely enclosed in a circular lantern of perhaps eighteen feet in diameter. The lantern walls are made of heavy cast-iron plates securely embedded in the top of the concrete tower. Upon the circular cast-iron wall, specially manufactured sheets of lantern glazing, ten feet high are mounted in rigid steel and bronze frames. The lantern is roofed with dome-shaped copper sheets. Every part, inside and out, is kept scrupulously clean.

The Lightkeeper.

One can well imagine that the lightkeeper's position in a giant lighthouse is no sinecure. In a violent hurricane, the wind pressure on the lantern may reach a pressure of forty pounds per square foot—while wave pressure has been registered to above three tons per square foot. To the contemplative mind such energy allowed to spend itself fruitlessly, in these days of mechanical ingenuity, is a matter for regret. Could some of the force developed by wind and water only be harnesed, it would be possible to install powerful electric dynamos sufficient to give the most magnificient light ever devised. And not only could there be motors for revolving the light, but it would open up a new field for fog-signalling apparatus. At present, the fog alarm is obtained by compressed air blown through a diaphone. It requires an expensive outfit of boiler and steam engine before the air can be compressed. Even so, the noise is far from rivalling thunder.

There is an ample field for brilliant young Canadians to devise improved aids to navigation. If the inventor could perfect a method of projecting waves of sound in parallel lines, similar to the projection of parallel light-rays, it is certain he would be received with open arms. Or, even if he could invent a perpetual motion device for revolving the light, he would surely make his fortune. In the meantime, we may safely trust to the present lighthouse administration to keep Canada in the vanguard of the lighthouse world.

LIGHTS AND LIGHTHOUSES.

New Zealand Coast.—The question of increasing the number of lighthouses on the New Zealand coastline has recently been under consideration, and it is stated that this important subject is to receive much greater attention in the future than it has had in the past. A contract for an iron lighthouse intended for erection at Castlepoint (between Wellington and Napier) has been executed locally, but in deference to the representations of shipmasters, it is probable that the structure will now be put up 25 miles further south at Flat Point. In Cook Strait, a lighthouse is to be built on or near to Cape Terawhiti, the scene of not a few wrecks from the earliest days of the Colony down to recent years. A third lighthouse is to be placed either at North Cape or on one of the Three Kings Islands at the extreme northern end of the country. A tender for a second order, incandescent flashlight and lantern for this lighthouse, has already been accepted in London.

Australian Coast.—With reference to the proposals for the improved lighting of the Australian coast, the Trade Commissioner for Australia has forwarded a copy of a report on the lighting of the north-east coast from Torres Strait to Cape Moreton. The report recommends the provision of 38 unattended long-burning acetylene gas lights, and the increase of the power of certain lights by installing incandescent lights burning vaporized kerosene. The provision of a twin-screw steamer of 600 tons gross for the supply of stores to lighthouses and for coastal duties is also recommended.

Montevideo, S. Am.—A large light buoy has been anchored in the channel leading to the port of Montevideo, 6,562 feet beyond the last pair of luminous buoys. The Government is planning to complete the double lines of luminous buoys from the limit of those planted by the Argentine Government up to and beyond Montevideo.



THE LIGHTHOUSE AT CAPE RACE
Which Shoots Out a One Million Candle Power Flash Every Five Seconds.



MARKING A DANGEROUS ROCK
The Light on Algerton Rock, St. Lawrence River

THE PROBLEM OF MARINE PROPULSION.

IN the course of a written contribution to the discussion invited by the North-east Coast Institution of Engineers and Shipbuilders, on the papers read by Messrs. E. L. Orde, A. C. Holzapfel and the Hon. Sir C. A. Parsons recently, relative to the possibilities of the Diesel Oil Engine, the Suction Gas Engine and the Geared Turbine, as compared with the reciprocating steam engine for purposes of marine propulsion, Sir William White observed that the most notable feature in the three Papers, and in no small part that of the discussion itself, had been the actuality of the statements made and their immediate and practical bearing on the designs of cargo steamers. Mr. Orde had struck that note firmly; and his method of comparison between a well-tried type of cargo steamer driven by reciprocating steam engines and a Diesel-engined ship of almost identical dimensions, of which the propelling apparatus closely approximated in power to oil engines now actually at work on board ships, gave a definite direction to the proceedings of the conference which had been well maintained.

Sir Charles Parsons and Mr. Walker in their joint paper followed the same line, dealing with facts based upon actual experience gained both with geared turbines in the Vespasian and other vessels, and with superheated steam as a source of further economies. Mr. Holzapfel also, in dealing with suction gas engines, had made recourse to actual experience in marine work of that character although in his paper the step taken from the Holzapfel I. to the typical cargo steamer used by Mr. Orde was necessarily much greater than the corresponding steps taken by authors of the other two papers.

This procedure had undoubtedly differentiated the present discussion from many, if not from most, preceding discussions of the important subject treated, namely, the application of internal combustion engines to marine propulsion. It was true, and was probably inevitable, that, as the discussion proceeded, there had been a tendency to diverge to some extent from the consideration of what was practicable at the present stage, into more or less speculative statements of what might or would become possible hereafter when experience and experiment with the new type of machinery had been enlarged. No objection should be taken to such divergence in the discussion because it had caused to be brought together in the "Transactions" of the Institution a great mass of facts in regard to the directions in which further advances might be made, and because this feature of the discussion had been kept within comparatively moderate limits.

Great Field for Internal Combustion Engine.

Personally, remarked Sir William, he had long held and expressed the opinion that there was a great field for the use of internal combustion engines in ship propulsion, especially in vessels of moderate dimensions or moderate engine power. On the other hand, as a diligent student of information made available to engineers and naval architects, he had been convinced that, up to date, there continued to be very serious difficulties in the way of constructing oil or gas engines which should develop great power in individual cylinders. It was well known that experiments in that direction were in progress, and it might be admitted that difficulties of this nature existed only to be attacked



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and if possible, to be overcome by engineers.

On the other hand, it could not be denied that these difficulties had not yet been overcome, and that engineers responsible for the design and construction of marine engines of the new types had hitherto found it safer to use comparatively small cylinders, and a large number of such cylinders in order to reach the very moderate aggregate power as yet applied in sea-going motor-driven vessels.

No one could have visited the Selandia or Jutlandia, continues Sir William, without being impressed by the multiplicity of cylinders and valve-gear for a total development of 2,500 h.p., especially when one remembers what such multiplicity involves during continuous running over long distances. Every one familiar with turbine-driven vessels of very great power would have been struck with the great contrast between their engine rooms and that of the Selandia. Engineers who had been in charge of steam turbines would not be eager to return to reciprocating engines whether they were actuated by steam or oil.

The Rotary Type Engine.

The practical advantages of a rotary engine were undeniable as well as considerable. If these advantages could be retained in association with equal or less fuel-costs and no less freight-earning capacity than were attainable with internal combustion reciprocating engines—and the facts stated by Sir Charles Parsons and Mr. Walker in regard to the use of geared turbines seemed to establish that possibility—it was reasonable to anticipate the oil-engine would not have such a "walk over" in the contest with steam engines as popular journalists—not practical engineers—had predicted. One thing was certain; shipowners would be guided by commercial considerations rather than by sentimental; and they would not be desirous of accepting avoidable risks. It was a matter for congratulation, therefore, that the first experiments with new, and necessarily rival systems of propulsion should be made on a moderate scale. Experience with cargo steamers already in service, or about to be employed, would settle many questions on which, at present, there was room for difference of opinion, and would lead to further advance in those directions which proved to be most promising.

Impracticability of Singular Solution.

One prediction might be made confidently; the complex and varied problems of marine engineering did not permit of any one or singular solution being found; no system of machinery could prove to be the best for all cases which occurred in practice; sudden or sweeping changes such as had been declared to be imminent of late were impossible. This discussion has served a useful purpose in making clear both the present position of affairs and the directions in which advances would be made in the immediate future.

THE NEW WHITE STAR LEVIATHAN.

IT is officially announced that in the new Atlantic liner building at Belfast by Harland and Wolff, Ltd., for the White Star Line, the name of one of the most successful vessels in the history of the company is to be revived. The name "Britannic" seems to be well chosen, and its selection should not only give pleasure both in the United Kingdom and America, but, if it is true that history repeats itself, a long and successful career may be predicted for the new vessel.

The First "Britannic."

As is well known, the original vessel of this name, built in 1874, had a most successful, indeed distinguished, and in some respects unique career, actually making her best passages after running a quarter of a century in the Atlantic service, and being subsequently engaged in the transport service for three years, during which time she was specially commissioned to take out to Australia the Imperial Representative Corps, composed of details of the various branches in the British Army on the occasion of the inauguration of the Commonwealth of Australia at Sydney, on January 1st, 1901.

New Vessel General Features.

In general features, the new vessel will be similar to the Olympic, but she will be of somewhat larger tonnage. There will also be various improvements introduced, resulting from the experience gained in the Olympic, which vessel will also be altered at an early date. The general structural changes will be very few, the strength of the Olympic under all weather conditions having proved entirely satisfactory. This is very strong testimony to the comprehensive grasp of detail in the evolution of this great liner.

In two important respects, however, both vessels are to bear evidence of the recent change in expert and public opinion as regards protection against the effects of collision with icebergs or other obstacles, both by the introduction of a complete inner skin extending to a considerable height above the load line throughout the most vulnerable portions of the vessels, and also by the increased height and number of watertight bulkheads, so as to render both ships as nearly unsinkable as possible—in fact, making them practically safe against all conceivable contingencies.

Inner Skin Arrangement.

The inner skin will consist of heavy plating, well stiffened, extending for more than half the length of the vessel from the watertight bulkheads in front of the forward boiler room to the after end of the turbine engine room, the inner skin being strongly connected to the outer shell by longitudinal plates and angles and specially strong connections at bulkheads and watertight divisions. The space between the outer and inner shells will be the width of the web frames at present in the ship, and this reinforced structure will run from the tank top, i.e., from the top of the double bottom, to a point well above the load water line. In addition, an extra watertight bulkhead will be introduced, and several of the existing bulk-heads carried right up to the bridge deck.

Increase Strength and Safety.

The additional strength and safety afforded by these methods will be easily appreciated, not only by experts, but also by the traveling public. Hitherto, it was considered sufficient if a vessel could float with any two compartments pierced; but the Olympic and Brittannic, besides having this extra protection against serious damage, will be able to float with any six compartments flooded; and with these special provisions it is not considered within the possibility of chance that so many compartments could be in this condition. Still even in the unlikely event of such happening, the vessels should still float. The White Star Line and the builders, having given the matter the most earnest consideration, believe they have solved the problem of carrying the precious human freight of these large and popular leviathans in absolute safety.

New Construction Costly.

Needless to say, the introduction of these provisions involves the owners in enormous cost, but in the White Star Line, the safety of life has always had paramount consideration.

In this connection, it has been arranged for the Olympic to be sent to Belfast this winter for the necessary alterations, which will bring her in all respects up to the high standard which has been decided upon for the Britannic, which vessel is now in the early stage of building.



THE SEA-GOING TUG-BOAT "DREADFUL."

THE single-screw tug-boat Dreadful, which is here illustrated, recently arrived at her destination—Vancouver, from England—after making a journey under her own steam of roughly 15,000 miles in the good time of 10 weeks, 2 days; this period including calls at St. Vincent, Rio de Janeiro, Coronel, and Diego, for bunkering purposes.

The Dreadful was constructed by James Pollock and Co., Ltd., for the Canadian Western Lumber Co., of Vancouver, and the nature of the work she will be called upon to perform is that of hauling large rafts of timber on Vancouver Bay and the rivers flowing into it. As this is a very onerous performance, it was most essential that the tug should have exceptionally rapid handling qualities. We are informed that it was amply proved during the official trial trip that she had these qualities. Her dimensions are:—Length, 125ft.; breadth moulded, 25ft.; draught aft, 13ft.



THE SEA-GOING TUG-BOAT "DREADFUL."

The propelling machinery consists of a set of triple-expansion surface-condensing engines with cylinders 15in., 23½ in., and 38in. by 30in. stroke, steam being supplied by a return-tube type boiler, working at a pressure of 180 lb. per square inch. The vessel was built to Lloyd's 100 A1 class, and under special survey, also to the Board of Trade requirements for tonnage, etc. The hull is divided into seven water-tight compartments. Pollock's patented stern frame has been fitted, which, it is claimed, greatly improves the towing capabilities, and was principally responsible for the excellent results obtained on the trial. The main deck is of pitch pine.

One of the principal features of the Dreadful is the unusual amount of accommodation for a tug. In fact, the vessel more resembles a high-class English tender than a tug. The principal appointments in the accommodation are:—On the main deck, chief officer's cabin, officers' mess-room, store, galley, guests' saloon, and two w.c.'s. On the bridge deck, the captain's cabin, store, two w.c.'s, and guests' room fitted up with the usual bunks, etc., and in the after part of the vessel, immediately below the main deck, the engineers' accommodation is provided, with a special saloon. The crew is berthed forward, access being had by a companion immediately forward of bridge steps.

The steering apparatus is of the combined steam and hand type, and is fitted in the bridge deck-house. The tow hook is of Pollock's special pattern, and it is fitted in addition to the usual tow stand and gear used in the United States. A steam windlass is placed forward for raising and lowering the anchors, and a steam capstan aft for dealing with the tow ropes. Steam radiators have been arranged in the pilot house, officers' rooms, guests' rooms, and crew quarters. Another special feature of the Dreadful is that instead of the ordinary boat davits being provided, a special system has been arranged so that the lifeboat is dropped clear of the vessel when lowering. The vessel also has See's ash injector, electric light throughout, a powerful searchlight, etc.

C.P.R. PRESIDENT AT VICTORIA.

THE outcome of the visit of Sir Thomas Shaughnessy, president of the C.P.R., and party to Victoria will probably be the award in the near future of the contract for two new ferry steamers, larger than the Princess Charlotte, for the Victoria-Vancouver-Seattle business. Despatches from North Bend show that Sir Thomas, in an interview given there stated that the C. P. R. would build additional vessels for the coastwise service of his company, and to secure information in regard to the requirements in this connection was one of the objects of his trip. When these steamers would be built would be the subject of later announcements. The necessity for the construction of these vessels was now being considered.

The passenger business from Victoria, Vancouver and Seattle is increasing so rapidly that the capacity of the steamers now in service is often taxed, and on board the steamers Princess Alice and Princess Adelaide twenty-five cots have been placed in the space formerly allotted to the cafe and grill to accommodate those passengers who have been unable to secure berths. The amount of travel during this season has surpassed all records and with bigger increases in prospect, the C. P. R., following out its policy of building in advance of the immediate requirements of the trade, will soon build two additional ferry liners.

THE MAN ON THE BRIDGE.

THE Imperial Merchant Service Guild an organization of captain and merchant officers, has taken advantage of public interest in the death of Captain Smith and the loss of the Titanic, to circulate a plea for "The Man on the Bridge," by Mr. C. T. Delaney, of New York. The Guild, which is thoroughly acquainted with life afloat, guarantees the reliable and accurate character of this glimpse of sea-life, and the reader may be certain, therefore, that he is not being treated to imaginary pictures of the Atlantic track. The note of the story is that of the bitter observation of a liner officer, who said:—"Sailors are forgetful creatures; a wise Providence makes them so; if we stopped to think over our hardships and dangers, the majority of us would throw up the dog's life in disgust."

No Sleep for 30 to 40 Hours.

The complaint of insufficient sleep is backed up by some remarkable illustrations. He shows how an officer, after being on his feet and without sleep for 39 hours, not infrequently has to go on the bridge "and take charge of a vessel valued at perhaps seven million dollars; cargo, mail, specie, and baggage worth another million at least, with about 3,500 souls on board.

"In nothing, are my statements exaggerated," he writes. "I have experienced all that I have described many times. I have been left in charge of a liner carrying a crew of 500, 2,200 steerage passengers, 300 second-class, and about 300 first, in all about 3,300 souls. These in addition to the valuable ship and freight have been under my charge at a time when I have been from thirty to forty hours on my feet, and without sleep or rest. The safety of all has depended on my vigilance at a time when soul, mind, and body have long been worn out. To keep awake at such times is torture; one must walk, walk, walk, and get through somehow; and all this in waters crowded with shipping and where vessels are subject to the whims of tides. At no other time in their lives, perhaps, are passengers in such jeopardy. Just when an officer should be at his best and have all his wits about him, he is as heavy as lead and worse than useless." Mr. Delaney (who wrote his pamphlet before the Titantic disaster) remaks that, "unless some fine vessel with her precious cargo is sent to the bottom through collision, these things, I believe, will not be rectified. It is only by good luck that this has not happened already, but luck will change some day."

The Strain of Fog Duty.

The strain of fog duty is touched upon in another serious passage.

"The British authorities demand that a master must be on the bridge of his vessel at all times during a fog, and since fog very often extends from the Banks right into New York, it frequently falls to the master's lot to remain on the bridge 60 or 70 hours. I have seen a master, 60 years of age or thereabouts, stand on a bridge for over 70 hours, with eyes that were useless through strain, and hearing impaired by the constant shrieking of the fog whistle. Is it right to expect such a man to command in case of emergency?" Passengers often add to the difficulties during the fog.

"For some unaccountable reason," Mr. Delaney says, "they all seem bent on playing shuffleboard right under the bridge. Their shouts, laughter, and the noise of the boards all add to the discomforts of the man on the bridge. His attention is diverted from the business in hand, and picking up another vessel's fog-horn is made much more difficult by these irrelevant noises."

"Icy Hell."

Mr. Delaney thinks the North Atlantic in winter is the worst place for continuous bad weather. Cape Horn is completely outclassed. "The suffering which a winter voyage on the Atlantic entails upon the man on the bridge of a liner is considerable. No matter how much clothing one may have on, the icy wind will penetrate it and chill one to the bone. Walking up and down is often impossible because the bridge deck is covered with ice and snow. For four hours almost in the one position this small hell must be endured."

Salaries of "Liner" Officers.

Finally, Mr. Delaney discusses the salaries of liner officers. He states that those of masters of the largest vessels range (on a liberal estimate) between $3,000 and $4,000 a year. From chief officer downwards, the scale ranges from about $1,400 to $400 a year, $1,400 being the top figure, only reached after ten or fifteen years' service. An officer joining a liner as seventh officer would receive $35 a month, and out of it be expected to keep himself in expensive uniforms and "look the gentleman" ashore.

The author sums up thus—"Size and speed have increased, while masters' salaries have considerably decreased. More voyages a year are made now than in former years. There is less home-life, on account of the short stays in port. Where, in the old days ships were ten days in port, they are now only three. Vacations are never granted; the only privilege in this direction is that once a year an officer may go home for all the time—usually three days—his ship is in port. Should an officer be foolish enough to fall sick through overwork, he soon finds himself on half-pay. Higher qualifications are demanded, and, above all, the demand made on the flesh and blood of the man on the bridge has increased fourfold. In every sense, a liner officer's life is a dog's life."

"DREADNOUGHT" DOCK TEST.

THE final lifting trial of the "Dreadnought" dock built by Swan, Hunter & Wigham, Richardson, Ltd., Wallsend-on-Tyne, for the British Admiralty, took place in the River Medway on Wednesday afternoon, 2nd October, when his Majesty's battle-cruiser "Lion," displacing 30,415 tons and drawing 31 ft. 6 in. of water was successfully docked and lifted. The actual lifting operation of the dock from a draft of 31 ft. 6 in. until the pontoon deck was awash at the sides occupied three hours and ten minutes. The total distance through which the vessel was lifted was 36 feet and the total quantity of water necessary to be pumped in order to raise the deck of the dock clear of the water was about 46,000 tons. After H.M.S. "Lion" had been cleaned and painted and some necessary repairs had been effected, the dock was lowered the following morning at 8 o'clock, and the ship was undocked during the day. The operation of lifting this huge battle cruiser was one of the greatest interest, as no ship of a similar displacement has ever been lifted out of the water by a floating dock. The time occupied in lifting the vessel was well within the limits prescribed by contract.

It is understood that the floating dock built at Birkenhead and stationed at Portsmouth, which is in all respects a replica of the Tyne-built dock, will be tested in a similar manner very shortly.

TERRY TURBINES.

GREAT Britain's new destroyers, "Haughty," "Havoc," Hereward," and "Hotspur" are to be fitted with Terry turbine forced draft sets. The success of the Terry forced draft sets on the British destroyers "Archer and "Attack," has resulted in the four above mentioned ships being fitted with units of similar design. The turbines will be built by Yarrow & Co., Ltd., Glasgow, who have exclusive rights for building Terry turbines for forced draft work in Great Britain.

Sydney.—The floating drydock, Duke of Connaught, arrived here in tow of two tugs from England on the morning of October 18. The tugs, after bunkering, proceeded with their tow on the last leg of the journey to Montreal.

MARINE ENGINEERING of Canada

A monthly journal dealing with the progress and development of Merchant and Naval Marine Engineering, Shipbuilding, the building of Harbors and Docks, and containing a record of the latest and best practice throughout the Sea-going World.

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INDUSTRIAL EDUCATION.

THE subject of "Industrial Education" has recently been given considerable prominence, and like other kindred questions, has received strong commendation and support, as well as wholesale condemnation. We are afraid that the industrial, like the religious world, is originating and trying to develop too many new theories, and that instead of bringing about the calculated improvement intended, there is every likelihood of its producing harm.

Why this craze for industrial education, let us ask? Will it improve the social standing of its recipient and make him a more useful citizen of any community? Will it afford opportunity for the acquirement of such a practical knowledge, as will, together with that gained in their daily occupation, make men more immune from hardship and poverty than the existing regime of economics finds them? Industrial education and technical education are neither of them going to work the wonders so glowingly depicted. The acquirement of either of them is no simple fee-paying and enrollment picnic. The operator's enthusiasm for study bubbles over when nights darken about 6 o'clock, and freezes stiff as Christmas draws near; it being then reasoned that "all work and no play makes Jack a dull boy," and in ninety cases out of every hundred, little fault can be found with the conclusion. Industrial and technical institutions are a boon to the few—those whose inborn desire would express itself in landing them on top of their fellows in any case, and who find in the means provided, such stepping stones as will more rapidly attain their goal.

The acquirement of wealth is just as fascinating to the student as it is to the millionaire, and we do not regard such a phenomenon with surprise, for he is cradled and brought up in an atmosphere charged with dollars. Small wonder is it then, that he shirks the long, hard road of study, and prefers to take a chance on some get-rich-quick plan. Can we blame him? We are afraid not, and until the examples from which he copies, adopt the industrial method of attaining their competence, we need not look for much success to attend a competitive and less attractive industrial school proposition.

OPERATING ENGINEER CONTRIBUTORS.

WE would call our readers' attention to the fact that we are at all times ready to receive for publication in Marine Engineering of Canada, not only more or less lengthy articles, but also brief, pithy letters descriptive of interesting occurrences pertaining to the day's work, of accidents to equipment, or of ingenious devices gotten out to overcome difficulties.

All operating engineers like to read of the other fellow's troubles, and how he overcame them; but far too few of them try to keep the ball rolling by sending in their own experiences. The mere suggestion that he should write for his technical paper seems to scare the average engineer. There is, however, really no reason why it should be so. What we want is ideas, not rigidly correct, grammatical writing.

When an engineer goes to the meetings of his local N.A.M.E. lodge or other association, he is not nervous about discussing with other members the happenings and troubles of his daily calling; then why not discuss these matters with a wider circle of fellow-engineers through the medium of this journal? Those who have not yet contributed to our columns should make up their minds to write us a short letter about the next thing they "get up against," and we venture to prophesy that they will be agreeably surprised to find how much less difficult is the exercise than they had supposed.

The season of navigation on Canadian Inland Waters is now drawing to a close, thereby affording more or less leisure to the operator. It seems to us, therefore, that no more educative, instructive and mutually profitable disposition of one's time can be made, than in committing to paper, for publication purposes, a personal record of the afloat experiences and happenings during the past six months.

LABOR AND INTELLECT.

WE are all conscious that two clearly defined sections of personality exist in the world:—Labor and Intellect. We are also conscious that their representatives are known as the "operator" and "thinker" respectively, and, further, that one is a workman and the other a gentleman. Did it ever occur to you that such a condition is prolific of inefficiency, and breeds envy and discontent? Again, it needs no microscope to perceive that too little work forms part of the "thinking" section, and too little "thinking" or opportunity for its exercise is in evidence among those dubbed workmen. Someone has said "that the mass of society is made up of morbid thinkers and miserable workers, each more or less at enmity with the other."

The nature of our employment, whatever it be, calls for much less pride than we are prone to take, and demands, instead, that we put excellence of achievement as the true measure, not only of our important selves, but of those others whose field lies in a different groove. All of us need the opportunity and should have the encouragement at our daily task whatever it be, to think as well as work constructively, and the more persistently this is practised, the less will be the suspicion attached to the motive behind innovations and the harder to determine caste in industry's ranks.

Marine News From Every Source

British Columbia

Victoria.—The contract for the construction of a big breakwater at Victoria, B.C., has been awarded to Sir John Jackson, of England, who was the lowest tenderer. He will do the work for $1,790,000. Five firms tendered. The next lowest offer, which was made by the McDiarmids of Winnipeg, was seven hundred thousand dollars larger than the Jackson bid. The breakwater will provide a large and well sheltered harbor at Victoria. The present harbor is small and difficult of access.

Victoria.—Destined for the Blue Funnel line's Liverpool-Puget Sound Service, the new steamship Nestor, of the Talthybius type, the largest of the Holt vessels, now building on the Clyde, will in all probability be ready to leave the Mersey on her maiden voyage to Victoria about the beginning of January, according to word received from the Old Country. The new steamship will be launched in November.

Victoria.—The Merchant Service Guild of British Columbia has recommended to the Minister of Marine that the passage in the Seymour narrows, known as the Maude island channel, be closed, on account of the danger to navigation caused at certain stages of the tide by swirls extending out into the main channel. The channel is about one-twelfth of a mile wide, and it is stated that the blocking could be carried out at small cost.

Victoria.—The Victoria Tug Co., Ltd., has been incorporated under the British Columbia Companies Act, with a capital of $56,229, and office at Victoria, to carry on a general steamship and passenger and freight business.

Vancouver.—The Marine Transportation Co. has commenced a service between Vancouver and California ports in the freight trade, with its s.s. Rupert City.

Prince Rupert.—During August, 74 vessels arrived at and departed from Prince Rupert, in connection with the coatwise trade.

Esquimalt.—The C.P.R. vessel which is under construction at Esquimalt, for the British Columbia coast service, is to be named Princess Maquinna.

The Great Lakes

Sarnia.—It is rumored that the Cleveland-Sarnia Sawmill Company intends to sell the tug Shaw this fall, and that it will purchase a new steel tug strong enough to tow heavy barges. A barge also will be purchased to handle lumber destined to points on the lakes.

Ottawa.—The breakwater at Beaverton is to be reconstructed and considerable dredging done, the work to cost $41,874. The contract has been let to D. Conroy.

Toronto.—Recently the steamer Malchawama was successfully launched at the Polson shipyard. The new vessel is 55 feet long and 13 feet wide, and is for use by the Marine and Fisheries Department of the Dominion Government. The cost of the new boat is $10,000.

Sarnia.—The season for dense fog is again with the mariner, and from now on the life of the sailors will be filled with hardships and perils. During the heavy fog which lay over the lower part of Lake Huron and the St. Clair River recently, navigation was at a complete standstill. The steel steamer John J. Barlum while rounding to her anchor just off Harrow's Point, below Port Lambton about 1 a.m., was rammed by the freighter Champlain. The bow of the Champlain hit the Barlum just in front of the aft bulkhead, a large, ragged crack being made down the side to the bottom of the boat. The boat began to leak badly and full steam was made for the Canadian shore, on which she was beached.

London.—The Cleveland & Buffalo Navigation Co. recently signed a year's lease for the docks at Port Stanley, formerly utilized by the steamer Forest City, and commencing early next spring a daily service will be operated between Port Stanley and Cleveland. The company also reserved the right to purchase the docks at the end of that time if it so desires. It is thought that the re-establishment of the international connection by the lake route may assist the London & Lake Erie Radial Company in its efforts to have the Lieutenant-Governor in Council exempt the company from a clause of the Lord's Day Act which prevents the maintenance of a Sunday service between this city and Port Stanley.

Sarnia.—The lumber barge Robbin, while turning around in the river ran foul of the dock of the Lebel Lumber Company. The lumber piles were scattered in all directions and the dock smashed-in for twenty feet. The boat was backing up and could not stop in time.

Winnipeg.—The excursion steamer Winnitoba, launched in 1909, was totally destroyed by fire at her dock, at Hyland Park, recently. Two barges, a wharf, a pavilion and a quantity of furniture on the steamer were also destroyed, making a total loss of $127,000, the half of which only was covered by insurance. The fire started on the steamer, although there was no fire in the boilers, and the theory is that the explosion of a lamp was the cause.

Port Arthur.—The powerful ice-breaking tug James Whalen, which for some years has been the pride of the fleet of tugs plying in the waters of Port Arthur and Fort William harbors, will soon be removed from its exalted position. A newer, larger and more powerful ice-breaker will be built for the Great Lakes Dredging Co. The new ice-breaker, to be built by the Western Dry Dock and Shipbuilding Co. at their plant in Port Arthur, will be the most up-to-date tug plying on the Great Lakes. She will be twenty feet longer than the Whalen.

Ottawa.—The question of extending the period of lake navigation this year is under consideration by the Government. The proposal involves the sometimes difficult work of keeping the harbors open, the lights in operation and the buoys in place during the late fall, a period often of severe storms and cold. Last year weather conditions were favorable, and navigation continued through

the first week in December. The course to be followed this year depends largely upon the views of the shipping men with whom the question is being taken up by the Department of Marine and Fisheries.

Hudson Bay.—A recent statement from Ottawa does not bode well for the success of navigation in Hudson Bay. The naval service department, it is said, has had to abandon the scheme to send coal to points in the Hudson Straits for steamers, owing to the refusal of the insurance company to insure the vessel which was to be sent. The vessel chartered was the Eric, owned by the Job Brothers, St. John's, Nfld. It is a sealing vessel, strongly built and equipped for ice work, yet the insurance company would not take the risk, chiefly because in case of accident very few vessels are in the vicinity to render assistance. The Pacific Coast outlet for Western Canada has no such drawback.

Penetanguishene. — The Government has awarded a contract for 55,000 yards of dredging at Penetanguishene. The work is to be done by the Penetanguishene Dredging Co.

Kingston.—The Dominion Government steamer Dollard, for lighthouse service in the lower St. Lawrence, was launched at the yards of the Kingston Shipbuilding Company on October 24. Miss Hilda Calvin, daughter of Mr. H. A. Calvin, one of the directors of the company, performed the christening ceremony and was presented with a solid silver card case, engraved. Short speeches were delivered by Mayor Hoag, Mr. W. F. Nickle, M.P., and Dr. A. E. Ross. M.P.P.

Sarnia.—Although the cry of vessel owners has been that the rates paid on cargoes this season are so low that there is no profit, three large boats ranging from 7,000 to 9,000 tons carrying capacity are reported to have met fixed charges, interest and maturing bonds, and were able to pay a ten per cent. dividend. It is said that the rate has been so low on ore and coal that the only hope for the boats of less than 7,000 tons capacity making any profit is that they get some grain cargoes later.

Montreal and Quebec

Montreal.—Several thousand dollars' worth of damage and serious delays to shipping were caused on September 24, when both gates of St. Gabriel lock in Lachine Canal were carried away. Two lake freighters were damaged and a sand barge was carried against the pier of the Wellington street bridge, injuring the bridge and becoming itself badly damaged.

Montreal.—The new two-and-a-half-million-bushel elevator belonging to the Harbor Commission, the largest concrete one in the world, was opened for business on October 2. The Hon. J. D. Hazen performed the opening ceremonies, after which he was tendered a luncheon by the Harbor Commissioners, at which over three hundred representative citizens were present. In his address Mr. Hazen said that Montreal's new equipment made her the best grain-handling port on the continent.

Montreal.—The Sincennes-McNaughton Line's steam tug Aurelie G., recently built at Glasgow, Scotland, sailed for Montreal, September 15. During her trials she made an average speed of 11 knots an hour.

Montreal.—All three members of the Montreal Harbor Commission have now handed in their resignation to the Dominion Minister of Marine; that of the Chairman, Mr. G. W. Stephens, being announced a few days ago. Messrs. Ballantyne and Geoffrion took the step some time since.

Montreal.—That the grounding of the C.P.R. steamer Lake Champlain opposite Dominion Park was unavoidable, and no one was in any way to blame, is the judgment rendered by the official board of inquiry. Recommendation was made, however, that the buoy lights on the river channel be more effectively supervised. The decision of the board of inquiry tends to reflect on the supervision exercised by the local branch of the Marine Department over the buoys in the river channel.

Three Rivers.—A steamer of the "alligator" type, belonging to the Department of Marine and Fisheries, was destroyed by fire recently on the St. Maurice River, near here. Louis Corbin, the watchman, lost his life in the blaze.

General

Customs Service.—The contract for the construction of a steamship for the Customs service on the Atlantic coast, for which tenders were recently received, has been awarded to J. I. Thorneycroft and Co., Southampton, Eng., the price being £56,300.

St. John, Nfld.—The Reid Newfoundland Co. has chartered the U.S. steamship Mexican for its service between Lewisport and Bay of Islands.

Marine Casualties.—During July, four employes were killed, and six were injured in the course of their work in connection with the navigation of Canadian waters. Of the fatalities, two were due to drowning, and one each to a fall, and to being struck by machinery; while of the non-fatal accidents, two each were due to machinery, and falls,, and one each to an explosion of kerosene, and to falling material.

Washington.—American ship building made a substantial increase for the three months which ended September 30, compared with the same period of last year, according to figures recently made public by the Bureau of Navigation, Department of Commerce and Labor. During the three months' period just ended, there were built in the United States 485 sailing, steam and unrigged vessels, of 80,281 gross tons. For the like period in 1911, 462 vessels of the same class were built, with a gross tonnage of 76,048.

Detroit.—Twenty-two trips in as many weeks is the record established by the Canadian steamer Stadacona this season. The Stadacona runs from Duluth to South Chicago, thence to Escanaba, and then to Point Edward; thus making what mariners term a three-cornered trip. One thing that makes the record of the Stadacona remarkable is that the dock at Point Edward, where she discharges her cargoes, is a slow one, and it is seldom that a boat gets in and out in less than two days. The Stadacona is operated by the Inland Lines.

Glasgow.—Messrs. Harland and Wolff, Ltd., have sold to a new company, the Burmeister and Wain (Diesel System) Oil Engine Co., Ltd., London, the engineering and boilermaking shops at Glasgow which previously belonged to the London and Glasgow Engineering and Iron Shipbuilding Company. Those shops were acquired by the Belfast concern in February last. In future the works will be used solely for the manufacture of Diesel engines on the Burmeister-Wain principle. Lord Pirrie, chairman of Harland and Wolff, will also be chairman of the new company, so that cordial co-operation is assured.

Allan Line Cadets—Hitherto cadets for the sea have not been carried by the Glasgow steamers of the Allan Line, but the company have now arranged for their doing so with a view to the lads being trained to become officers. It is stipulated that boys who intend to follow the calling must be of good character, and free of physical defect or disability. They should be 16 years of age, not less than 5 feet 2 inches in their stockings, and have a chest measurement, without clothes, of not less than 31½ inches. They will be indentured for four years.

Master and Mates Union—A movement is on foot along the Great Lakes to form branches of the Master and Mates

Union along the lines of those organized in Great Britain. It is the intention of those interested in the movement to keep the control of the new organization in the hands of the mates. Masters are to be admitted, but their status will be about the same as that which the foreman occupies in relation to the union of his trade.

THE ST. LAWRENCE ROUTE.

UNDERWRITERS at Lloyd's have, it is understood, definitely refused to make any concession in the matter of rates for the St. Lawrence route, basing their decision on the ground that although many improvements have been effected during recent years in connection with the navigation of the river, accidents are still of frequent occurrence. As a matter of fact, this season already no fewer than sixty vessels have had to be dry-docked at Montreal for repairs, while one steamer was sunk in collision with a Canadian Pacific liner. Marine insurance people are anxious enough to develop traffic through Canadian channels, and, moreover, they cut against one another quite as keenly as other business men, but they cannot be persuaded to reduce the British North American tariff.

Representations have also been made to Lloyd's with a view to a prolongation of the Great Lakes season. Under the existing arrangement this comes to an end on November 30, mainly owing to the fact that policies run out then; but it is believed that if the cover for the various risks could be extended for a few weeks longer nearly twenty million additional bushels of grain would be available for export. There is, however, no likelihood that the suggestion will be considered favorably, as statistics show that the autumn months usually bring a big crop of casualties.

In the circumstances, it is expected that the scheme for the organization of a marine insurance association in the Dominion on the lines of Lloyd's will now be proceeded with, more especially as the Government has promised financial support, chiefly for the purpose of guaranteeing the difference between the high premiums on the St. Lawrence and the much lower ones in force on the American routes.

GIANT HARBOR CRANE COLLAPSES.

BY the complete collapse on September 19, of the Belfast Harbor Commissioners' 100-ton crane, erected in the year 1879 at Alexandra Wharf, contiguous to the berth in Messrs. Harland & Wolff's north yard, where two giant liners for the White Star and Holland-America Co., are being built, and almost in a line with the building berth where the White Star steamship Germanic is under construction, two men lost their lives, while another man was taken to the hospital, suffering from a fractured leg. The crane, which had recently undergone extensive overhauling and refit, was being tested, and steel plates, weighing, roughly, about 130 tons, were being lifted, when the whole structure came down with a crash, suddenly, and was precipitated bodily into the water. Several men on the crane at the time were carried into the water along with it, and two of these—David Neill, craneman, and Robert Lennox, apprentice fitter—were drowned. Another man, James McIlhone, fitter, was picked up and taken to the Royal Victoria Hospital, where, it was found, he was suffering from a fractured leg and shock.

The crane is one of the largest in the United Kingdom, and with the exception of the new floating crane, belonging to Messrs. Harland & Wolff, was the most powerful in Belfast Harbor. The crane was considered to be in the best working order. The preceding lifts, up to 120 tons had been well executed, and the crane was to all outward appearance working with perfect regularity and precision. There appeared to be no undue strain at any part. A number of men working at the structure when the crash came were able to jump clear in time to avoid being carried into the river, but the three unfortunate men who were precipitated into the water were unable to get away from the entangled mass of falling iron. The noise of the collapse was heard fully a mile away.

SCOTTISH SHIPBUILDING.

SCOTTISH shipbuilders are all very well employed, and that they have been busy recently is proved by the facts that the output of new tonnage during September was a record for the month, and that for the nine months ending with September, a record for that period.

There is now, however, a very marked falling off in the placing of new contracts, and the work booked bears no relation whatever to that launched. Owners decline to pay the present high prices for contract vessels. They prefer to buy second-hand ships, or ships on the stocks of which they can obtain early delivery, and so be able to take advantage of the high freights, while builders are heavily handicapped by the high cost of materials and labor, the scarcity of good workmen, the continued difficulty of obtaining early deliveries of materials from the steelworks, the possibility of having to meet demands for increased wages in the near future, and the prospect of protracted negotiations with all the trade unions regarding working agreements.

The following table shows the work done in all the Scottish shipbuilding districts since the beginning of the year:—

	Clyde,		Forth,		Tay,		Dee,	
	Ves.	tons.	Ves.	tons.	Ves.	tons.	Ves.	tons
Jan.	18	39,526	1	1085	2	1250	2	410
Feb.	18	43,609	2	700	1	1440	6	1099
March	20	52,205	1	740	1	200	4	610
April	32	63,764	1	750	2	920	8	945
May	29	53,456	4	860	—	—	7	1720
June	29	37,025	—	—	2	2600	7	730
July	19	40,367	4	1730	1	2400	4	800
August	24	87,599	3	3250	1	1200	5	500
Sept.	21	54,722	3	640	2	1950	5	995
	209	472,273	19	9755	12	11,960	48	7809

The Clyde totals, as already indicated, are records for September and for the nine months. On the nine months there is an increase as compared with last year of over 39,000 tons, and as compared with 1906—the previous best year—of about 10,000 tons. The record for the 12 months, however, is held by last year with a total of 630,583 tons, so that if 1912 as a whole is to mark another step forward on the part of the district, over 158,000 tons, or about 53,000 tons per month, will have to be launched. That this will be done is rather too much to expect, although there are a number of large vessels to launch before the end of the year. The following are the Clyde figures since 1880:—

Year.	Sept. Tons.	Nine Months Tons.	Year.	Sept. Tons.	Nine Months Tons.
1912	54,722	472,273	1895	35,867	263,554
1911	50,628	433,218	1894	36 760	245,025
1910	46,948	342,631	1893	17,265	192,264
1909	45,991	268,449	1892	38,755	274,746
1908	21,201	245,102	1891	20,210	216,677
1907	37,268	458,351	1890	30,897	254,070
1906	46,366	462,277	1889	40,500	239,195
1905	45,546	359,643	1888	35,805	184,335
1904	43,203	293,571	1887	17,220	146,800
1903	27,223	299,940	1886	29,401	141,896
1902	53,045	362,287	1885	16,521	134,029
1901	38,920	369,046	1884	36,589	219,888
1900	33,975	327,925	1883	31,450	293,023
1899	44,519	334,274	1882	42,649	264,743
1898	38,149	287,557	1881	29,021	242,063
1897	14,053	207,269	1880	24,510	173,220
1896	36,236	276,452			

"Marine Service" is the title of an unusually well illustrated 16-page booklet, just issued by the Terry Steam Turbine Co., 90 West Street, New York. It shows the extensive use of the Terry turbine in the merchant marine, and in the United States and foreign navies for driving electric lighting generators, boiler feed and circulating water pumps, ballast pumps and forced draft fans. One peculiar use of the Terry turbine as noted in this pamphlet is that of grading the bank of the Mississippi River. This little booklet should certainly be in the hands of those who like to know the use of the small steam turbine on shipboard, and will be sent on request to any of the company's offices, or 90 West Street, New York.

Great Britain's Part in Building Canadian Steam Ships

Being the seventh of a series of short illustrated articles descriptive of steamships recently built and presently building in Great Britain and Ireland for the Canadian merchant and passenger trade. From the details given, it will be seen that the latest fully proved developments in shipbuilding and marine engineering are being adopted by those responsible for the steamship service to and from and within the Dominion.

HYDROGRAPHIC SERVICE. VESSEL "CARTIER."

IN view of the fact that the builders of the Dominion Government Hydrographic Service Steamer Cartier—Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne, have received an order for a similar vessel, improved and modified, it is believed that the following brief illustrated description of the Cartier will be interesting, and tend to familiarize our readers with this important department of Canada's marine development.

The Cartier was designed for survey work on the eastern coast of the Dominion, and is so equipped as to be able to remain away from port for long periods when necessary.

Vessel Data.

Length	173 feet 6 inches
Breadth	29 feet 1½ inches
Depth, molded to upper deck	15 feet
Gross tonnage	555.7 tons
Net tonnage	234 tons
Deadweight capacity	230 tons on 11 feet
Displacement	1,035 tons
Draft	12 feet 8 inches
Service speed on trial	11½ knots

As will be noted, there are many watertight compartments in order to ensure the safety of the vessel when in uncharted waters. On the lower deck, aft, is accommodation for the hydrographic staff, consisting of saloon, bathrooms, living-room and four staterooms; while forward, on the same deck is accommodation for the petty officers, seamen and firemen. On the main deck, aft, is a deck saloon and mess-room for the hydrographic staff, with pantry and stewards' stores adjoining, and forward is the messrooms for the navigating and engine-room staff, with pantry and stewards' stores and two state-rooms for the second and third engineers and mate. In the forecastle side houses, are washroom and bath-room accommodation for the crew and petty officers on the port side, and carpenter shop and coal storage on the starboard side. Immediately under the forecastle is the storage room for gasoline in tanks.

Machinery Equipment.

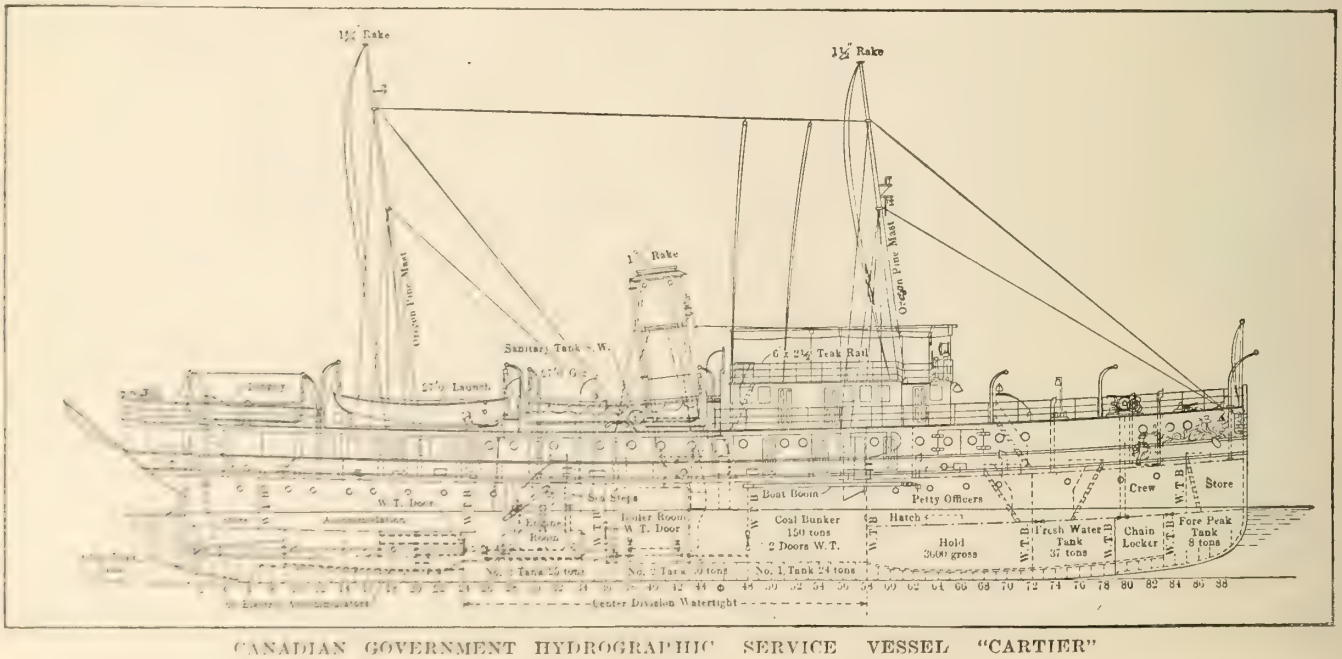
The Cartier is fitted with twin-screw triple-expansion propelling engines, having cylinders 11½ inches, 18 inches and 31 inches by 24 inches stroke. These are supplied with steam by two cylindrical multi-tubular boilers, 10 feet 6 inches diameter and 11 feet 6 inches length, at a pressure of 185 pounds, and working under Howden's system of forced draft.

The auxiliary machinery consists of a steam windlass, by Clarke, Chapman & Co., Gateshead-on-Tyne, steam and hand-steering gear, by John Hastie & Co., Ltd., of Greenock, and a refrigerating engine of the No. 3 single vertical marine (CO2) type, by Messers. J. & E. Hall, Ltd., of Dartford, Kent. There is steam heating throughout the vessel, and in all rooms and toilets, with the exception of those under the forecastle, there are steam radiators, each having 25 square feet of heating surface over 1,000 feet.

On the shade deck, is a "Lucas" sounding machine, arranged on the port side bulwark rail, and towards the centre, abaft the main mast, is a double-cylinder vertical sounding winch, constructed by Clarke, Chapman & Co.. This winch has cylinders 5 inches diameter and 6 inches stroke, and is fitted with a whipping drum 9¼ inches diameter keyed directly to the crankshaft. The drum is fitted outside of the frame, clear of the engine, while the other end of the shaft is fitted with brake hand-wheel. The winch has reversing valve, screw-down stop valve, etc., and is mounted on a cast iron bedplate with a trough cast in it to prevent oil and water running over the deck. Amidships on this deck is the chart-room and pilot-house, with bedroom and day-room for the sailing master. The chart-room, 15 feet by 7 feet, is fitted with a special drawing table, 5 feet by 10 feet, built in three thicknesses of pine, the front and frame being of oak. There is accommodation for a total crew of forty-three, including officers and engine men.

General.

As the Cartier may be required to work in extremes of temperature, an elaborate system of ventilation has been introduced. In shallow water the staff



CANADIAN GOVERNMENT HYDROGRAPHIC SERVICE VESSEL "CARTIER"

of the Cartier will leave the steamer and conduct surveys in launches and boats, afterwards returning to the vessel to work up their observations. Accordingly there are provided two gasoline (petrol) launches, each 27 feet by 6 feet 7 inches by 3 feet, as also two gigs, 27 feet by 6 feet by 2 feet 5 inches, and one dinghy, 18 feet by 5 feet 4 inches by 2 feet 2 inches. The steam winches, provided for the housing of the boats, are arranged with special leading blocks, so that they may be used for hoisting any one of the four boats.

There is an electric searchlight on the bridge, and the other special outfit of the vessel comprises a standard compass of the Lord Kelvin navy pattern, while the steering compasses include a Ritchie standard compass and a Wilson & Gillie compass. The Cartier was built from the designs and under the superintendence of R. L. Newman, of Victoria, B.C., consulting naval architect for the Canadian Government.



CANADIAN GOVERNMENT HYDROGRAPHIC SERVICE VESSEL "CARTIER"

CORRUGATED SHIPS.

RATHER more than three years ago there was launched a ship, the Monitoria, the sides of which instead of being flat as usual, had a double corrugation—two outward curves extending 22 in. beyond the frames, with a corresponding inward curve between them—running fore and aft between the load-line and the bilge, and tapering off into the normal shape at the ship's ends with the rounding inward of the bows and quarters. Since then, four other ships of the same construction have been launched, and two more are now being built. In them, owing to increase of strength in the hull, the frame spacing has been extended by half—that is, from 24 in. to 48 in. where the corugations run; while the stringer plates, or longitudinal frames, are dispensed with. This leaves the plates always open to inspection, so that corrosion may at once be detected; also, in the carrying of bulk cargoes, such as coal, the hold is more readily cleared, as there are no stringer plates for the cargo to rest upon.

In a heavy sea, whether ahead or abeam, the corrugated sides are said to form such a protection to the ship, by their breaking action upon the oncoming seas, that her movements are at all times easy, and it is stated that loads of timber have been stacked 19 feet above the deck, amounting to more than 40 per cent. of the whole cargo.

Fuel Economy.

With regard to fuel economy, in comparison with plain ships of identical dimensions and engine power, the following particulars are given:—

	Plain ship.	Monitor.
Draft	17 ft. 11¾ in.	17 ft. 11¾ in.
Displacement	4,554 tons	4,614 tons
Speed	8¾ knots	8¾ knots
Indicated h.p.	740	635
Admiralty constant	249	293
Coal consumption..	12 to 13½ tons.	10¼ to 11 tons.

On the records of the corrugated ships since they began work, an all-round saving in fuel of some 16 per cent. is claimed, and thus, although on account of the corrugations they expose a larger wetted area, yet with the same expenditure of fuel, they can travel further than a plain ship of like dimensions and engine power. Even at full speed, it is stated that their propellers may be seen revolving in clear water, and the wake is smooth, clear, and much less in width than the ship's beam. It is suggested, therefore, that the stream lines are improved, and that the hollow between the outward corrugation, acting as a flume or duct, feeds the propeller with a firmer and steadier body of water to work in.

So far, the corrugated construction has been applied only to bluff-bowed freighters, of moderate speed, but experiments that have been made point to the conclusion that corrugations on the hull of a slim, fast ship will materially add to her speed also. Naval experts are naturally on the alert for anything that will give a steadier gun-platform and eliminate, or at least reduce, vibration, notably in swift cruisers and torpedo craft. These advantages, together with a greatly strengthened hull, the advocates of the new type claim that corrugations will bestow.—T.E.S. Correspondence.

GLASGOW'S HARBOR GRANARY.

THE walls of the large granary which is being erected at the new quays at Meadowside, Glasgow, are now, according to the Scotch press 36 feet from the ground. The building is to be 312 feet long, 72 feet wide, and 160 feet in height to the cope of the elevator tower. The outside walls are being constructed of solid brickwork, the columns are of cast iron, and the floors of steel joists and concrete. The walls of the silo portion and the division walls of the bins are of ferro-concrete; but the faces of the outside walls are being clothed with 9-inch brickwork. The building is in two portions—one, the granary proper, has a storage capacity for 11,000 tons of grain, and the other, consisting of the silos or bins, has storage for 20,000 tons. Over 900 feet of subways have been formed in the quay wall for band conveyors, and on the surface of the quay there will be two elevators traveling on rails. Band conveyors will carry the grain from all parts of the ships to all parts of the building, or from the building to ships at the quay, and there will be arrangements for loading railway wagons and lorries. The machinery will be operated by electricity obtained from Patrick Burgh power station.

Glasgow.—Harland & Wolff have sold to the recently formed Burmeister & Wain (Diesel system) Oil Engine Co., Ltd., the engineering and boiler making shops at Govan, which it acquired in February of this year from the London & Glasgow Ship Building Co. The works in future will be devoted entirely to the manufacture of oil engines for marine purposes. Harland & Wolff will retain their Glasgow ship yard, and will probably obtain from Belfast what steam engines they require for the ships built there.

INTERNATIONAL SUPERVISION OF THE OCEAN.

By Fred. Harsley, M.A.*

ON April 22, seven days after the Titanic disaster, there appeared in the English Press and a few days later in the German Press, a letter from me entitled "International Patrol Boats." About a month afterwards, the American Admiralty sent out the scout-cruiser "Birmingham" to warn ships of dangers in the Atlantic ice-region. This thankworthy American action, however, corresponded but in part with my own proposal, and can hardly be regarded as a permanent solution of our serious problem; nor, indeed, can the scouting or policing of the ocean by any one nation, even if that nation were willing to undertake such a responsibility, be regarded with full favor and confidence by other powers who may, at present, have as great if not greater interests at stake.

New Type Vessel Proposed.

To protect ocean-commerce in time of war, we are being continually told that England, Germany, and the rest feel forced to maintain large fleets, but what have the great nations done in the past to protect the traffic of the sea in times of peace? My proposal was, shortly, that Europe and America at least, now join hands for their common protection on the water in the times of peace; that they come to some arrangement with each other and cause to be designed a new type of boat to patrol the seas—not only in those latitudes where certain dangers (such as ice) are known to recur periodically, but also in those regions where the dangers are of an uncertain or varied nature; that these new boats be international boats to prevent their being improperly used in time of war; that all ships receiving telegraphic messages from them be required by international law to regard the warnings given, and the patrol boats themselves to keep a log of all warnings and messages sent out and received. This does not preclude other than these official ships being expected to give warning of dangers encountered. This proposal, I have reason to believe, will be discussed at the International Conference to be held in London, and, in view of that, I should be glad to be permitted to add a few remarks, which, perhaps, would have been out of place immediately after the catastrophe.

Advantages Accruing.

In addition to the primary object of serving as movable stations of warning, this new type of ship would have, among other, the following advantages:—

(1)—The traveling public and their friends, would have a feeling of greater security; (2)—More especially, because this new type of vessel would give warning of any derelicts observed, and, if necessary, sink them. (3)—They would themselves, in certain cases, be able to go to the rescue of ships in distress. (4)—They could be so built as to be used for scientific purposes by research-workers of the nations in the determination of meteorological observations, currents, changes in the conformation of the sea-bottom through current or earthquake (since the loss of the Titanic a ship has been wrecked on a new, presumably earthquake-raised and consequently uncharted rock), habits of fish, etc. These observations, moreover, would be continuous, and therefore of enhanced scientific and practical value. (5)—The inauguration of such patrol boats would be a step further on the way to international understandings, and the work done by them and on them would be co-operative and for the good of all.

Ocean Police Feature.

There is, however, another consideration which outweighs all the rest, including within it possibilities of some significance. These patrol boats might be regarded as the equivalent of an Ocean police, established for the protection of all nations; their establishment would, in that case, be a further confession, and this time a practical one, assuming concrete form, that the oceans belong to all, that they have, in fact, become fundamentally internationalized; in other words, that they have become neutral territory; which again means that if two or more nations wish to use the sea for fighting they must act as they do on land, keep away from this neutral territory, the open sea, and fight within their own (or the enemy's) home or colonial waters. With the inauguration of international patrol boats the high seas would be, with common consent of the nations, but the international highway, and nothing more, which all nations might at any time use for their friendly or unfriendly visits to each other, but which would be forbidden for belligerent purposes; just as national public places—whether village green, city street, town-common, or highroad are neutral and forbidden by ordinary law for belligerent purposes to the private citizen.

We have County police, city police, and a river police, both to protect us and to serve as an outward and visible sign of the law that restrains; why not ocean police to serve as a symbol of the law that shall bring restraint to bear upon such laxity and confusion as the Titanic inquiry has again clearly proved still exist on the ocean?—such laxity being, to some extent, a survival and now a futile tradition of the habits of the early sea-farers, the old "sea-dogs" and venturers, who, like some of their successors of to-day, risked life and limb both of themselves and others in a spirit of bravado for material, selfish, and yet it must be confessed, in their case, sometimes glorious, "records." Though much freedom of judgment must always be left to the captain, our navigators have, perhaps, not yet all learned that there is true freedom only within the law. The ocean police would be an effective symbol of that law.

International Dominion of High Seas.

We have already made much progress in national and international orderliness, and also in the method of moderating our antipathies and settling our differences, both on land and sea; we no longer, as in the darker Middle Ages, have warlike feuds between noble and noble, or battle between town and town; the spacious days of Elizabethan buccaneering are over, and Napoleonic marches through many folks' country, in Europe at least, are, we may hope, gone for ever; no two civilized nations to-day fight their quarrel on neutral ground. Has not the time arrived when we may urge Europe and America to consciously take another forward step, and by the symbol of ocean police decide for the world that the dominion of the high seas must henceforth be international? If this necessitates an extension of the three-mile-limit, except in narrow straits, that too would only be the introduction of a reform long overdue; just as the supplementing of shore lifeboats by national patrol boats around our coasts is overdue, which any map showing the year's wrecks can prove .

Many will call an endeavor to restrict battle at sea to home and colonial waters academic, perhaps Utopian; but if it is in any way reasonable, it will some day be practicable, and that as soon as it receives ethical value, that greater ehtical value than the present principle which regards the open sea as an open battle ground. It will then become the law under which we have agreed to live; and the building of armaments, the burden of which is felt by all, would readily adapt itself to the new and higher normal conditions.

If the nations can make this one of the thoughts of the new century, and with willingness strive for its realization, then too, implicite, the loss of the Titanic, which has led us to these remoter considerations, and similar or dissimilar past ocean-evils and catastrophes, so often international in their effects, will, humanly spoken, have been amply atoned for.

*Fellow of Owens College, Manchester, and Lecturer at the University of Berlin.

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ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals who Have Been More or Less Prominent in the Marine Sphere

Nicholas Huff, chief engineer of the Detroit, Belle Isle & Windsor Ferry Co. fleet, was recently tendered a complimentary banquet by President Campbell, and presented with a handsome traveling bag on the occasion of his retirement after over 20 years' service.

Captain King of the R. & O. Steamer Corona was recently presented by the crew of that vessel with a gold-headed umbrella, suitably inscribed, as an appreciation of the pleasant relations that had existed on board during the past season. Chief Engineer Norman Griffin made the presentation, and the gallant captain in his reply, expressed pleased and hearty good wishes in his acceptance.

Mr. G. M. Bosworth, vice-president of the C.P.R., in charge of steamships, denied the truth of the report that his company was about to purchase the P. & O. line of steamers. "There is absolutely nothing in the report. We are doing nicely in our own way, and have no intention of launching out on such a world-wide campaign for control of 'around-the-world' business. You can deny the report in full," was his concluding remark.

Sarnia.—A large party of the high officials of the Richelieu & Ontario Navigation Co. and the Northern Navigation Co. left for points up the lakes recently, on the Hamonic. The party number seventeen and were from Toronto, Montreal, Hamilton, Collingwood and Sarnia. The trip was to inspect the docks and facilities of the Northern Navigation Co., which has recently been amalgamated with the Richelieu & Ontario Company.

Toronto.—Mr. G. P. Grant, Toronto, has purchased the palatial steam yacht Zara from Albert L. Stephens, of Grosse Point, and will, it is understood, take her to the Atlantic Coast for a winter cruise in southern seas. The Zara is well known to Detroit yachtsmen as one of the finest and largest pleasure vessels on the river. She was built in Paisley, Scotland, in 1891, and was brought across the Atlantic for a wealthy New Yorker, who sold her to Mr. Stephens about the time that the tariff law was amended, providing for imposition of an annual tax on foreign built pleasure craft, the alternative being given of enrolling such vessels under American registry with an ad valorem tax. Mr. Stephens placed the Zara under American registry, and expended a large amount of money in alterations and improvements after bringing her to Detroit in August, 1908. A conservative estimate appraises the value of the craft at about $50,000.

The Zara is of steel hull construction, 152 feet in length over all, with a keel length of 136 feet, breadth of 20.1 feet and depth of 11.7 feet. Her gross tonnage is 184 and net tonnage 80, affording room for spacious cabins. Her quadruple expansion engine has an indicated horse-power of 500. A feature of the vessel is her figurehead, the gilded form of a woman.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont., Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclavia Street, Kingston, Ont.; Captain T. J. Murphy, 111 William St., Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy St., Kingston, Ont.; Captain James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rideau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

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LLOYD'S RETURNS.

THE returns compiled by Lloyd's Register of Shipping, which only take into account vessels whose construction has actually begun, show that, excluding warships, there were 505 vessels, of 1,846,829 tons gross under construction in the United Kingdom, at the close of the quarter ended September 30th, 1912, of which 478 were steel-built steamers. The tonnage now under construction is about 73,000 tons more than that on hand at the end of last quarter, and exceeds by 400,000 tons the tonnage building in September, 1911; the present figures being the highest ever recorded in the society's quarterly returns. In addition, 115 vessels of 482,875 tons are building abroad under the Society's survey.

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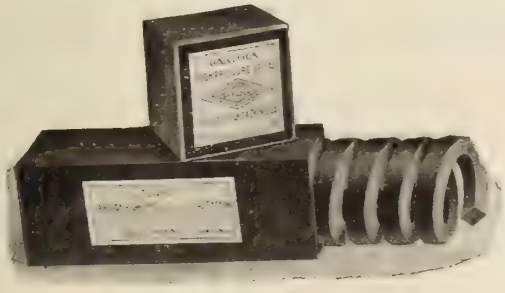
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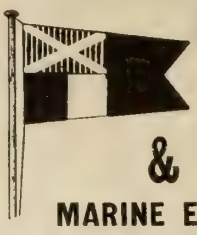
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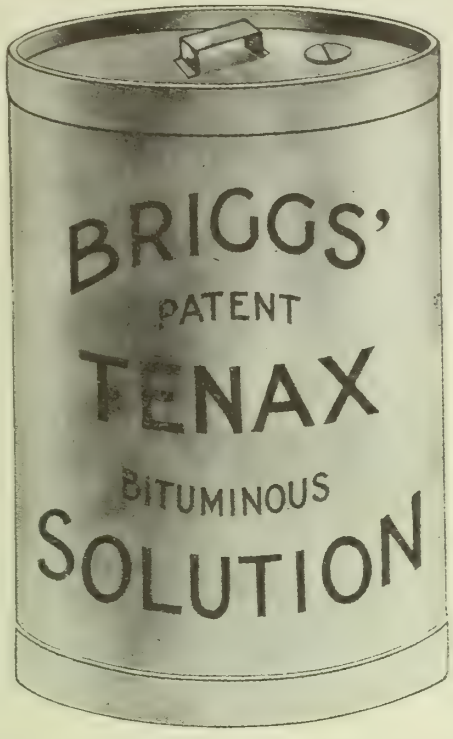
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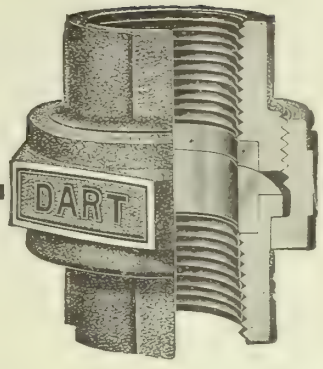


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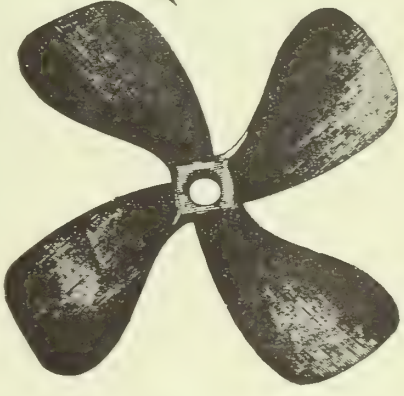
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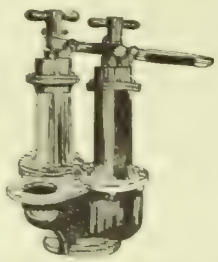


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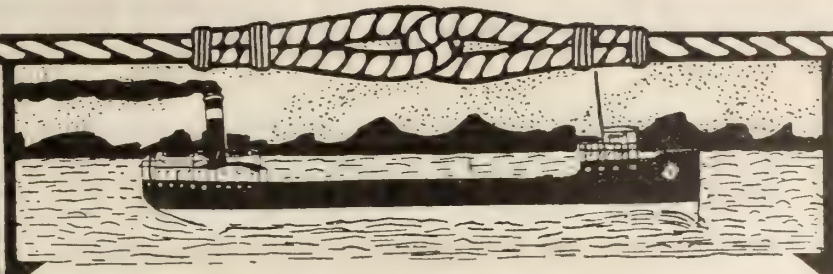
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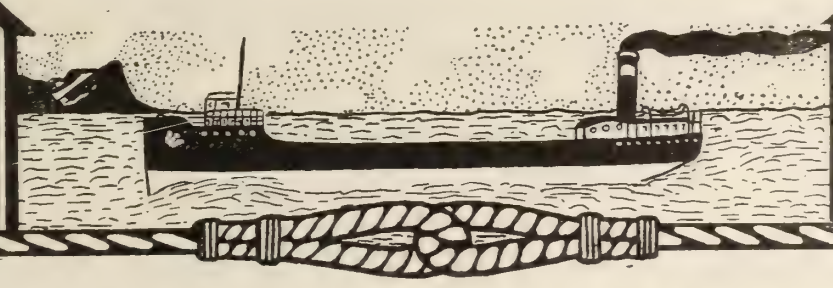
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The Twin Cities of Fort William and Port Arthur, Ont.

By J. H. Williams

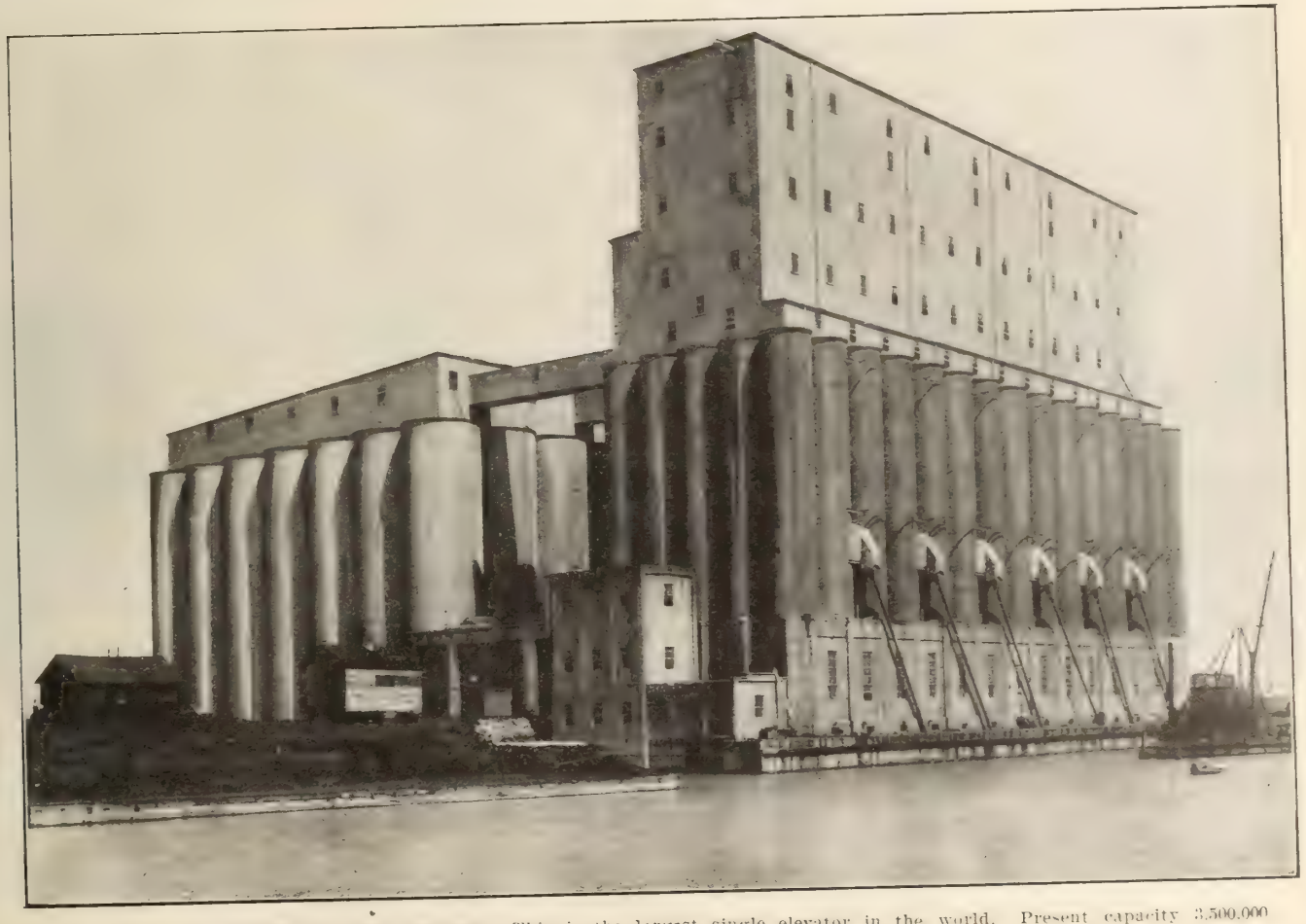
The future of these two ports is absolutely assured. However enterprising railroads may be, and however many of them are built from East to West, Thunder Bay on Lake Superior must always be the head of a vast navigation; and water transport, whatever be the inventions of the remote future, can scarcely lose all its advantages.

IN spite of their comparatively isolated location, far from any other large centre of population, the two cities of Fort William and Port Arthur have of late years gone ahead by leaps and bounds in a manner comparable to that of the most flourishing cities of the Far West. With a combined population of some 37,000, and an unsurpassed situation as regards water borne traffic, the industrial outlook for the twin ports is of the brightest, not only on account of their advantageous position at the head of the Great Lakes, but also because they are the bulk-breaking points for both eastbound and westbound shipments.

Fort William enjoys quite a respectable antiquity, having been founded in the year 1800. In those early days it was the chief trading station of the great North-Western Fur Company of Montreal, and life there would seem to have been sufficiently interesting. In the words of Mr. A. G. Bradley, the well-known writer on Canadian subjects: "Fort William was built in 1800 and in and around its walls gathered in their hundreds the Indians and half-breeds of the West, with their skins and peltries. It was strongly fortified, and was occupied by quite a garrison of the company's employes. Dr. Bryce, who has had access to their old journals, quotes freely from them in his memoir of the Hudson's Bay Company, and we are told of the wild revels that at Christmas and other festive seasons used to transform partners, clerks and the whole bureaucracy of this remote settlement into uproarious schoolboys. In the great dining hall, sixty feet long, and hung with pictures of the Nabobs of this North-Western wilderness, liquor flowed like water, and the revellers, seated in a long row, one behind the other on the floor, using tongs, shovels and brooms as imaginary paddles, ran imaginary rapids, and shouted the boat songs of the woods, while Indians, half-breeds, and coureurs-de-bois looked on in wonder and admiration."

Fort William retains no trace of its ancient character. Where schooners used to lie awaiting their load of furs great steamships now receive their burdens of wheat from rows of the largest elevators in North America. Port Arthur is six miles distant from Fort William and straggles in picturesque fashion up a dry hillside on which are built many fine residences. The view over Thunder Bay is very fine, and as the city faces to the east, the early riser is frequently rewarded by a glorious sunrise.

It will perhaps be best to treat the two cities separately; and since it has considerably the larger population we will commence with Fort William.



Grand Trunk Pacific Elevator, Fort William. This is the largest single elevator in the world. Present capacity 3,500,000 bushels. A second annex to hold an additional 2,500,000 bushels is rapidly nearing completion.

Fort William.

The city lies low at the outlet of the Kaministiquia River, which here empties itself into Thunder Bay by three mouths known as the Mission, the McKellar, and the Kaministiquia Rivers respectively. These three outlets are being dredged to a depth of 25 feet and a width of 400-500 feet as fast as conditions will allow, and will eventually give a dock frontage of 18 to 20 miles.

The facilities here found for rapidly handling grain between cars and boat are probably unexcelled at any port in the world. There are a dozen elevators scattered along the banks of the river, their present total capacities amounting to some 22,000,000 bushels. Of these that of the Grand Trunk Pacific Railway is by far the largest, having a capacity of three and a half million bushels. This forms the largest single elevator in the world and is absolutely fireproof, being constructed entirely of reinforced concrete and steel. Its cost was in the neighborhood of $1,250,000. A second storage annex is now being added, which will bring the capacity up to six million bushels. It will eventually be enlarged to ten million bushels and will then form one of four similar units which the G. T. P. have planned to erect at their Fort William terminals. The company will thus eventually have storage room for forty million bushels.



View in the Grand Trunk Pacific elevator at Fort William. This shows one of the five belts that transfer grain from the working house to the annex. In the distance is the tripper.

The G. T. P. elevator was constructed by the Canadian Stewart Co., Montreal, and represents the very latest ideas in elevator design. The track shed stands between the working house and the storage annex, and has four tracks, on each of which there are five receiving pits below track level. Thus, twenty cars can be unloaded simultaneously. The disposition of the grain on being received will depend upon its grade, its condition or its identity. It may be elevated and stored in the annex there to await shipment; if wet it may undergo the drying process; cleaning and separating may be necessary; or by a convenient system of spouting it may be delivered to cars or vessels.

All wheat cleaning is done on the ground floor, there being five sets of cleaning mills, three mills to a set. The grain is elevated by 19 legs, there being 5 receiving legs, 5 shipping legs, 5 cleaner legs, 1 flax leg, 1 screenings leg, 1 special oats leg and 1 leg to the drier. From the receiving pits in the track shed the grain travels on 36-inch rubber belts to the foot of the receiving legs in the working house. Each leg is equipped with a double row of 15 x 8 x 8-inch buckets, and has a capacity of 18,000 bushels per hour. On reaching the top floor in the cupola the grain is weighed in five large hopper scales, each of which has a capacity of 120,000 pounds (2,000 bushels of wheat) and is equipped with printing and recording mechanism. After weighing the grain is distributed to the various storage bins in the working house or the annex. Five 36-inch 4-ply belts carry grain from the working house cupola to the annex and five similar belts in the basement complete the return circuit to the shipping legs. A 42-inch 4-ply reversible belt conveyor in the cupola transfers grain lengthwise of the elevator from the weigh-scales to the annex belts, the car spouts or the working house bins.

Power Equipment, Etc.

Power is purchased from the Kaministiquia Power Co., who deliver 3-phase current at 22,000 volts, 60 cycles. In a transformer house attached to the elevator this voltage is reduced to 550. Thirty-seven motors of the squirrel cage type are installed throughout the elevator and develop a total of over 2,500 H.P.



A dredge of the Great Lakes Dredging Co.'s plant on the Kaministiquia River, Fort William.



A corner in the machine shop of the Great Lakes Dredging Co., Ltd., at Fort William.

Artificial lighting is afforded by some 800 incandescent drop lights of 16 c.p. each. Each hanging lamp is equipped with a wire guard, and the cables are enclosed in armored flexible conduits. The superintendent's office on the ground floor is connected by telephone

with all departments and the operation of the elevator is further facilitated by speaking tubes, electric bell signals and a series of red and green signal lights at each of the receiving and shipping legs.

Coal Handling Plants.

The twin ports are, of course, the transhipping points for enormous quantities of west-bound coal, the Customs returns for the year 1911 showing that during the previous season of navigation over 3,000,000 tons were received at Fort William alone. The C.P.R. old coal dock handled 1¾ million tons, the balance having been dealt with by the Fort William Coal Dock Co., Ltd. This company's plant was established on the Mission River near the G.T.P. terminals in October, 1910. The coal handling equipment was installed by the Hyle & Paterson Co. It consists of two bridges, equipped with 2-ton buckets and operated by 150 H.P. motors. Contracts for doubling the capacity of the plant have just been completed by the Brown Hoisting Machinery Co., Cleveland. The new tower has a single bridge, with a 5-ton bucket and will be able to unload 3,000 tons of coal a day, which is equal to the capacity of the two old bridges combined.

Last year much coal had to go West via Duluth and Superior, owing to lack of sufficient apparatus to handle it at Fort William and Port Arthur, but as soon as the new terminals of the G.T.P. and the C.P.R. are completed this condition of affairs will, it is hoped, be a thing of the past. The coal dock at the C.P.R. terminals, which has just been completed, is of the most modern description and has a total storage capacity of 2 million tons. There have been installed two Hulett electrically operated 8-ton coal unloading machines, one 9-ton rehandling bridge, three 35-ton scale lorries, and about 3,000 ft. of bin and trestle system, as well as Christy box car loaders. It is expected that this



Ice breaker "James Whalen" at work in Port Arthur harbor. She is the property of the Canadian Towing and Wrecking Co., Ltd., Port Arthur.



Great Lakes Dredging Co's. Floating Drydock with tug "Sarnia." The dock will lift boats of 1,000 tons, drawing 15 ft.

In addition to this huge elevator there are a dozen others, five of which are owned and operated by the Canadian Pacific Railway. Of these the largest, known as C. P. R. Elevator D, has a present capacity of 1¾ million bushels, and is now being enlarged to hold an additional 1,600,000 bushels.

Mention must also be made of the large flour mill and elevator of the Ogilvy Flour Mills Co., Ltd. The mill is fitted throughout with the very latest equipment and has an output of 3,500 barrels daily. The elevator is of reinforced concrete and has a storage capacity of 1¼ million bushels.



The two grain elevators of the Canadian Northern Railway at Port Arthur. Their combined capacity is 7,000,000 bushels. Additions are about to be made with a view to doubling this capacity. The illustration shows the elevators as seen from the lake.

plant will very readily handle the largest boats that are in use on the great lakes, in one day's time—10 hours.

To give an idea of the size and capacity of these machines it may be mentioned that the motor equipment on each of the coal unloaders consists of a total of 550 h.p. and the bridge is equipped with motors aggregating 700 h.p.

All this coal handling equipment was supplied and installed by the Wellman-Seaver-Morgan Co., Cleveland.

Corporation. These works give employment to about 350 men.

The various buildings occupy a site of 22 acres on the left bank of the Kaministiquia River, about five miles from the city hall. They comprise machine shop, pattern shop and four foundries for the production respectively of general castings, car wheels, brake shoes and pipe.

In addition to this plant the Copp foundry employs a number of men,

The Kaministiquia Power Co.

One or two concerns in Fort William generate their own power, but the very great majority purchase power from the Kaministiqua Power Co., Ltd., who have a hydro-electric generating station situated at the Kakabeka Falls, about 14 miles above Fort William. The present capacity of this generating station is 21,000 h.p., but the intake works, power house, etc., were built sufficiently large to allow of additional equipment being



The Atikokan Iron Co's. Blast Furnace, Port Arthur. Output 200 tons daily. The Roasting Plant on the left of the track has a daily capacity of 500 tons of ore.



Hydraulic Dredge "Shuniah" digging steamboat channel and reclaiming land at Western Drydock and Shipbuilding Co's. plant, Port Arthur. The "Shuniah" forms a unit in the large fleet of the Great Lakes Dredging Co., Ltd., Port Arthur.

The Grand Trunk Pacific Railway are also constructing extensive coal docks with a storage capacity of one million tons. These are located at their terminals on the Mission River, opposite their grain elevator.

Great Lakes Dredging Co.

Another prominent concern located on the water front is the Great Lakes Dredging Co., Ltd. This is really a Port Arthur company, since its offices are in that city. However, its yard and workshops are in Fort William on the McKellar river, and it is generally looked upon as a Fort William industry. The company does a general dredging business and has a large fleet of dipper and suction dredges, tugs and scows. The plant consists of machine shop, pattern shop, blacksmith shop, boiler shop and storehouse. In their yard the company build all their wooden dump scows, derrick scows, dredger hulls, etc., and look after the complete upkeep of all their outfit. The equipment includes a small floating drydock shown on page 261. The dock is 100 feet long by 70 feet wide and will lift boats of 1,000 tons displacement and drawing 15 feet. It is fitted with two sets of pumps, one of the plunger type and the other of the motor-driven centrifugal type; so that either steam or electricity may be used as circumstances may render most convenient.

The Canada Iron Corporation, etc.

One of the largest industrial plants in Fort William is that of the Canada Iron

stoves being the principal output. As the Thunder Bay district abounds in iron ore the future of both the cities is linked with the exploitation of iron and steel manufacturing. The Canada Car & Foundry Co., have recently commenced the erection of a large plant in Fort William and a nut and bolt factory will be established in the near future, while other steel and iron industries are about to be located in Port Arthur, as will be hereafter mentioned. Thus it is clear that a very few years' time will see full advantage taken of all the natural resources of the district.

installed which will eventually bring the output up to 50,000 h.p. The rates charged are understood to be $23 to $25 per horse power per year of 365 days.

Port Arthur.

Port Arthur is picturesquely situated on a hillside, and in this respect has the advantage of Fort William, which stands on a flat, uninteresting site. Both cities have many fine residences, the number of these in Port Arthur being especially noticeable.

As is well known, the C.P.R. in the early days made Port Arthur their Lake Superior depot, but after a few



Two vessels in drydock at the plant of the Western Dry Dock and Shipbuilding Co., Ltd., Port Arthur. This dock is 700 feet long, 98 feet wide and has a depth of water over the sills of 16 feet.

years deserted the place and moved on to Fort William. This of course was a great loss to the former town, and to the outsider Port Arthur seemed destined never to be anything more than a residential city. However, its citizens never let their ambition and enthusiasm cool, and by and by Mackenzie & Mann came along with the Canadian Northern Railway, and promptly set about developing the water front, building docks, etc., until they have long since filled the blank left by the C.P.R.

As evidence of their faith in the future of the city as an industrial centre, apart from its importance as a grain handling port, the C.N.R. opened in March, 1911, a fine hotel of 110 rooms. This is known as the Prince Arthur, and occupies a commanding position overlooking Thunder Bay. The accommodation provided quickly proved inadequate and the hotel has, this year, been enlarged to 150 rooms.

C.N.R. Elevators, Coal Dock, etc.

A grain elevator is seldom a thing of beauty from an artistic point of view, but we think it would be difficult to find an example less objectionable in this respect than the C.N.R. elevator at Port Arthur, a view of which is shown on page 261. The elevator consists of two units, A and B, with a total capacity of seven million bushels. Each unit has a working house, which is tributary to a storage annex of 2½ million bushels. Elevator A was erected in 1901, the other being added three years later. The working houses are of wood, while the annexes are of the Barnett-McQueen Co.'s patented hollow tile construction. Both elevators are driven by steam, the engines and boilers being built by Goldie & McCulloch, Galt, Ont. Engine room A contains a single cylinder condensing Wheelock engine of 650 h.p., steam for which is provided by three return tubular boilers. Engine room B is equipped with a twin cylinder Wheelock engine of 1,000 h.p. This also runs condensing and is supplied by four boilers similar to those in A. These boilers also provide steam for a Hess dryer located in a separate building near power house B. This dryer has a capacity of 750 bushels per hour of tough grain or 500 bushels for damp or wet grain. The combined unloading and shipping capacity of the two elevators is: Unloading, 30 cars per hour; shipping 180,000 bushels per day. The C.N.R. are about to enlarge these elevators very considerably. Report says that their capacity is to be doubled.

This company's coal dock built in 1906, is also being greatly enlarged. When completed it will have a storage capacity of 500,000 tons and will be able to unload 1,200 tons per hour. This contract is being put through with all speed by the Barnett-McQueen Co.

The important plant of the Western Drydock and Shipbuilding Co., Ltd., at Port Arthur, forms one of the city's principal industries. This plant was described at considerable length in the issue of "Marine Engineering of Canada," for May, 1912, to which we would refer readers who are interested.

The Port Arthur Wagon Works, recently opened, is another important concern giving employment to 200 men.



View in the annex of C.N.R. Elevator "B," Port Arthur. Some of the bins are here seen full to the top with golden whe at from Canada's Western provinces.



DOCKS AT THE FOOT OF ARTHUR ST., PORT ARTHUR.

This firm will eventually turn out 15,000 farm wagons a year.

Among other concerns that call for mention is the Pigeon River Lumber Co., whose mills have an annual capacity of 50,000,000 feet of lumber. Stewart & Hewitson operate an extensive quarry and rock-crushing plant which is taxed to its utmost capacity, owing to the large demands for road-making and construction work.

Another important plant is that of the Atikokan Iron Co., who operate a blast furnace with a capacity of 200 tons per day. The ore is brought from the Atikokan range 126 miles to the West on the C.N.R., and is of a high grade containing over 60 per cent. of metallic iron. The company manufacture their coke from West Virginia coal in a range of 100 beehive ovens having a total capacity of about 150 tons per day of 24 hours.

The blowing engines for the blast furnace were built by the Southwark Foundry & Machine Co., Philadelphia. They have a capacity of 30,000 cubic feet of air per minute at 15 lbs. pressure, though 10 lbs is the pressure actually used. Steam for these engines is supplied by four Canada Foundry Co.'s double furnace water tube boilers, fired by the waste gases.

The Atikokan Iron Co., is a Mackenzie & Mann interest, and was started largely as an experiment. However, it turned out so successful that it was decided to follow it up by the establishment of a large steel works on the northern outskirts of the city. This will be an $8,000,000 concern and will turn out rails, angles, structural shapes, etc. The starting of such a plant will ,of course give a tremendous impetus to the city.

Another concern which is now starting work on a large scale is the Ontario& Western Car Co., Ltd., who are building a $5,000,000 plant to turn out steel and wooden cars of every type for steam and electric railroads, street railroads, contractors' dump cars, etc., etc. This plant will give employment to 1,000 men.

The Whalen Interests.

Mr. James Whalen, a long-time resident in Port Arthur, has numerous interests in that city. Besides being president of the Western Drydock & Shipbuilding Co., he is interested in the following concerns, viz:—The Great Lakes Dredging Co., Ltd., the Canadian Towing & Wrecking Co., Ltd.; the Canada Pebble Co., Ltd., and the Thunder Bay Contracting Co., Ltd. The last named company had the installing of much of the new coal handling plant of the C.P.R. at Island No. 1, Fort William, and are also putting in about 4½ miles of crib concrete dock at the G.T.P. terminals on the Mission River.

The Canadian Towing & Wrecking Co. have a fleet of eight tugs and three wrecking barges fitted with clam shell buckets for handling cargo. The barges are fitted with wireless telegraphy to enable orders to be transmitted to them from shore. When not engaged on wrecking work they are used for gathering sand and gravel from lake beaches for use in making concrete. The twin harbors are at present using some 60,000 cubic yards of sand and gravel annually. The ice breaker tug "James Whalen," belongs to this fleet and is illustrated on page 261. She was built in 1906 by the Polson Iron Works, Ltd., Toronto, and has done useful work each spring in hastening the opening of Port Arthur harbor. Her dimensions are:—Length overall, 108 ft.; beam, 24 ft.; depth, 14½ ft. Her cast steel propeller is 10 ft. 6 in. in diameter and is driven by a 20-40-36 fore and aft compound jet condenssing engine. Steam at 160 lbs. pressure is supplied by a Scotch marine boiler 12 ft. 6 in. in diameter by 12 ft. long. Her speed in summer is 11½ miles per hour.

The Canada Pebble Co., is a concern engaged in gathering granite pebbles for use in tube mills, and for grinding cement clinker, copper ore, etc. They are also used by paint manufacturers for grinding their lead. These pebbles are found in large quantities along the north shore of Lake Superior and are sorted by screens into sizes varying from 1½ to 4 inches, and are loaded into bags for shipment.

General Features of the Two Cities.

The intervening six miles between the two cities is traversed by a double track street car system, on which very fine cars of the pay-as-you-enter type give an excellent service. The system is owned and operated by the two municipalities as is the telephone service, which is efficient and remarkably cheap.

Both cities have well paved streets and fine stores, and are well provided with churches, schools and hospitals. Their growth in the last ten years has been truly wonderful and it is certain that their expansion during the coming ten years will be even more marked.

ICE AND LAND PERILS TO NAVIGATION.

PROFESSOR BARNES, of McGill University, Montreal, has submitted to Hon. J. D. Hazen, Minister of Marine and Fisheries, an interim report on his investigations of methods whereby ships may be warned of the nearness of ice or land. The professor regards the results of the last season's work as highly satisfactory, and the work will be continued in the coming winter.

Professor Barnes has now for three winters been investigating conditions in the St. Lawrence, in the Straits of Belle Isle and along the Labrador coast, the Department of Marine and Fisheries supplying him with a steamer. A Government vessel will be placed at his disposal as soon as possible next spring. It is hoped that these investigations will result in the removing of the unjust discrimination in insurance rates against the St. Lawrence route. The concluding portion of Professor Barnes' report is as follows:—"I must report, as a result of my study of icebergs and land, that very important results have been obtained indicative of methods which should be developed for equipping ships for avoiding ice and land. The experiments have been so decisive and reliable that I must strongly recommend that attention be devoted by the Government and by steamship companies towards adopting accurate temperature recorders on board ship.

Again, I must emphasize that it is to a study of the variations of temperature in the sea and not the temperature itself which will enable navigators safely to avoid ice and land at night or in time of fog. I would strongly recommend the Government to equip at once a ship to map out the isothermal lines around the coasts of Newfoundland, Labrador and the shores of the Gulf of St. Lawrence and Straits of Belle Isle, for, in so doing a chart could be prepared which would be of great assistance to navigators using these waters.

INAUGURATION OF DRY DOCK.

ON Nov. 18, the Duke of Connaught formally declared the floating ship dock, which bears his name, and which is now in the basin prepared for it at Maisonneuve, to be open for business. A special train with the Duke's private car attached, and having on board besides the Governor-General, the Minister of Marine and Fisheries, Hon. J. D. Hazen, as well as other ministers and members of the Vice-Regal Staff, came from Ottawa for the ceremony.

The chairman of the Harbor Commission, Major G. W. Stephens, presented an address to the Duke on behalf of the board, and the latter having replied, afterwards declared the dock open and ready for use. The commissioners issued over one thousand invitations to leading citizens to be present at the ceremony.

In dedicating the new floating drydock, to its particular service, the Duke said:—"By the arrival and installation of your great floating dock the great reproach against the St. Lawrence trade route has been removed, and the largest vessels can now run up to Montreal, secure in the consciousness of entering a

port which is in possession of a competent modern equipment for repair and examination. I trust that a strong impetus may be given to the industry of carrying Canadian produce from Canadian ports through Canadian waters. That this trade should be carried in Canadian-built ships cannot be expected for the present, but I hope that within our lifetime, the flag of the Canadian mercantile marine may often be seen flying over ocean-going steamers which have been constructed in Canadian yards.''

THE PILOT MONOPOLY ON THE ST. LAWRENCE.

WRECK Commissioner Lindsay has been instructed by the Department of Marine and Fisheries to proceed to Quebec for the purpose of conducting a searching inquiry into the grounding of the Royal George on the Island of Orleans on the night of November 6. Until such investigation is held, the department declines to express an opinion on the matter. The investigation, however, will be immediate, and every attempt will be made to place the blame for the disaster.

''Bavarian'' Disaster Recalled.

An almost similar disaster occurred some years back, when the Allan Line steamer Bavarian went on the rocks in a snow flurry, at Beaumont shoals. The investigation which followed placed the blame upon the pilot. The St. Lawrence route from Quebec towards the Atlantic has never, however, been considered a dangerous route.

A Close Corporation.

Until an investigation is held in the present case, the blame cannot be placed, but the disaster recalls strong criticism which has from time to time been levelled against the virtual monopoly enjoyed by the Pilots' Association below Quebec. The association is a fairly close corporation, in which few, excepting those in favor with the association, are allowed to enter. Examinations are held by the corporation, the money is pooled and divided equally among the members, irrespective of merit, and no vessel can choose its pilots; the men going in turns, unless some special arrangement is made. The result is that the largest vessels may obtain the least competent pilots.

Prefontaine Broke It.

Between Montreal and Quebec the system is different, the companies being able to choose their own men, although the pilots all belong to the Montreal corporation of pilots. A similar arrangement to that in force below Quebec existed above Quebec until Raymond Prefontaine, some years ago, broke up the monopoly and placed the matter under the Montreal Harbor Commission. The disaster is regarded as a most serious blow to the growing prestige of the St. Lawrence route, for the safe-guarding of which every effort has been made for the past ten years. The tendency is to divide the blame between the pilot, the company, and the immigration regulations.

The Immigration Regulations.

Formerly, steamships were allowed to land immigrants at any hour of the day or night, but some years ago, while a night landing was being made a gangway slipped and a number of immigrants were thrown into the St. Lawrence and drowned. To guard against the recurrence of such an accident, the immigration authorities made regulations providing that immigrants could not land between sunset and sunrise. The Royal George was making 18 knots an hour through a slight fog to reach the wharf before sunset, in order to land the steerage immigrants.

In the effort to save the expense of keeping these on board for another night, a valuable ship has been destroyed and the reputation of the St. Lawrence route damaged.

The pilot is blamed for running his vessel through thick weather at full speed, and it is probable that the Interior Department will revert to the old regulations whereby immigrants can be landed at any time during the night.

SUPERHEATERS FOR MARINE PURPOSES

IN his presidential address, delivered before the Institute of Marine Engineers, Mr S Hunter said that superheating was to-day engaging considerable attention. There were now some 700 vessels of various types fitted with superheaters, about 600 of which were owned on the Continent of Europe. A passenger liner about 800 ft. long and 30,000 I. H. P. was being built and would be fitted with superheaters. This vessel would have twin-screw triple-expansion engines and the consumption of coal, it is estimated, would be from 10 to 15 per cent. less than with saturated steam. A similiar saving, he claimed, could be effected in almost any triple-expansion engine. An interesting feature of one arrangement of superheater was that it could be applied to almost any existing marine reciprocating engine, without structural alterations. This was an important consideration for shipowners, who were somewhat concerned as to what to do with their steam-driven boats as competition with oil engines and other motors becomes more acute.

THE ST. LAWRENCE ROUTE.

SHIPPERS and business men generally are becoming seriously concerned over the number of accidents which are occurring on the St. Lawrence route. The recent stranding of the Royal George of the Canadian Northern Line, has called fresh attention to the numerous disasters which have taken place this year, and severe criticisms are being heard in regard to the ''do-nothing'' policy of the Marine Department of the Borden Government. Never, since the late Hugh Allan brought his little brig ''Jean'' up to Montreal one hundred years ago, have there been so many accidents as during the present year. Despite the fact that the late Government spent upwards of $38,000,000 in deepening, straightening, buoying, lighting, and otherwise improving the channel, the present Administration seems to be content to adopt a ''do-nothing'' policy. Practically all they have accomplished during the twelve months they have been in office has been to ''fire'' the Harbor Commissioners of Montreal, whose splendid work in connection with the channel and port has made Montreal one of the finest harbors on the continent.

Ten Bad Accidents This Year.

The long list of disasters which occurred during the present year will have the tendency to make Lloyds increase rather than decrease their insurance rates on the St. Lawrence. The following is a list of the vessels involved: — The Helvetia was cut in two by the Empress of Britain in the Gulf and proved a total loss; the Corsican struck an iceberg and although somewhat seriously damaged, yet was able to make Liverpool under her own steam; the Lake Champlain and the Hungarian both grounded near Longue Pointe, a few miles below Montreal; one of the Manchester Line boats struck ice in the Gulf and was forced to jettison her cargo in order to make St. John's; the Bengore Head is now being repaired at Quebec after going ashore off Flower Island; the Bellona ran aground on the rocks below Quebec; in the harbor a boat carried away one of the canal gates and laid up navigation for nearly 36 hours; a week ago the Cecilia L. foundered on Lake St. Louis with a loss of twelve lives, and quiet recently the Royal George grounded near Point St. Laurent. During the year there has been an unusually large amount of ice, as well as fog and bad weather.

In addition to the heavy monetary loss and the interference with shipping, the greatest drawback will be in connection with the insurance rates. After such a season, Lloyds will probably increase their rates, and as the high rates have been the chief factor in retarding the development of the port, the season of 1912 is likely to prove a disastrous one in the annals of shipping.

PROGRESS IN NEW EQUIPMENT

There is Here Provided in Compact Form a Monthly Compendium of Marine Engineering Product Achievement.

THE BAWDEN STEAM PUMP.

By Calliope.

THE Bawden" steam pump being manufactured in Toronto by the Bawden Machine Co., Toronto, embodies in its design many features of interest to sea-going engineers and those connected with steam and hydraulic installations generally. It is the outcome of 24 years' practical experience of steam pump design and manufacture, and presents, as its leading feature, simplicity of detail. The Bawden Machine Co. have secured the patent rights together with the services of Mr. Atwood, the patentee, whose record and extensive experience of pumps generally reflects success for this new achievement in the Canadian power field. The writer had the pleasure of seeing a trial pump in action, and, needless to say, was favorably impressed with its work.

The main idea, that occurs to one on close examination of the design and constructional detail are the concentration of effort apparent in furnishing the operating engineer with a simple and reliable mechanism, whose individual parts are easily accessible, thereby avoiding long delays for examination and repairs; and the subdivision of these parts so as to reduce cost of renewals in case of accident by frost or otherwise.

Detail of Construction and Operation.

The "Bawden" pump is governed by two piston valves which are a ground fit and are controlled by the action of live steam only. All tappets, levers, springs, rock shafts, tubes or other extraneous gear are dispensed with. A special feature of the piston valves is the arrangement for catching leakage of steam due to wear and tear, thus preventing the valves from getting into equilibrium at their driving ends, and resulting in a longer period through which they will work without repair. The steam piston is automatically cushioned at each end of the cylinder by a special design of the two main steam ports, dispensing with all adjusting mechanisms. There are no dead centres and there is no tendency to hang up. Claim is made also that it cannot be held up. It will run under full load at the fastest and slowest speeds, thus providing the engineer with a flexible pump for all purposes. The firm are making three types which are illustrated by the accompanying cuts:—

Fig. 1 represents the regular line suitable for moderate pressures and vacuum service. These have packed water pistons, brass liners, and valve seats which are driven into taper seats and held in with brass stoppers accessible through handholes.

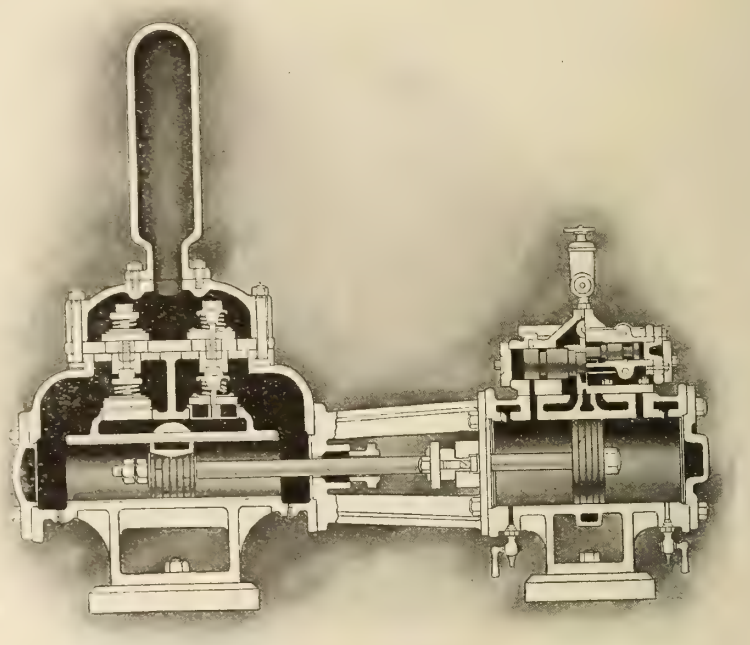


FIG. 1. THE "BAWDEN" PUMP FOR MODERATE PRESSURES AND VACUUM SERVICE.

Fig. 2 also represents a pump with packed pistons but with outside valve boxes containing the water valves, each one accessible by removing top cover. This pattern presents special features,

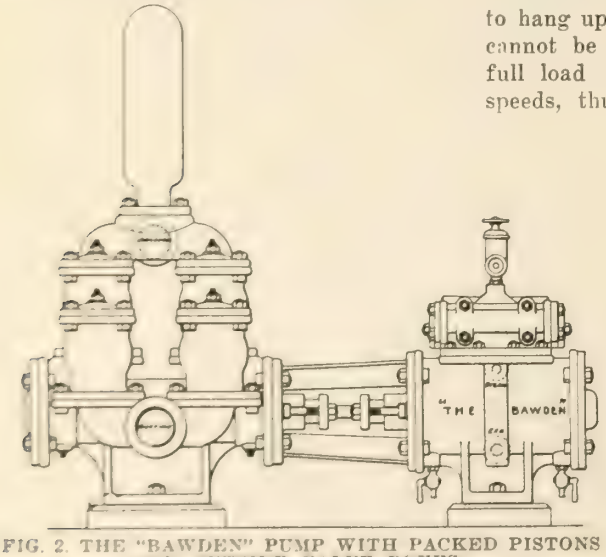


FIG. 2. THE "BAWDEN" PUMP WITH PACKED PISTONS AND OUTSIDE VALVE BOXES.

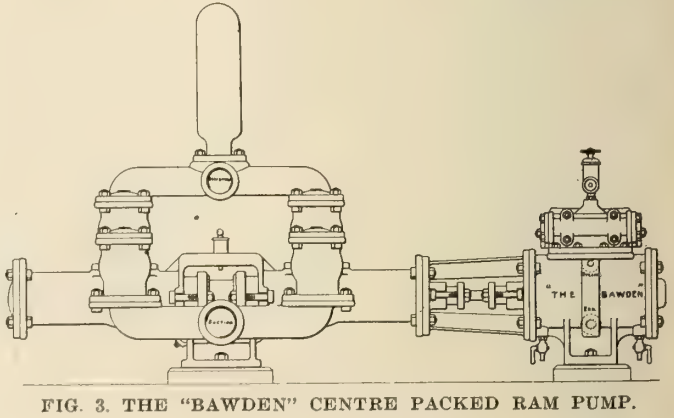


FIG. 3. THE "BAWDEN" CENTRE PACKED RAM PUMP.

as all parts subject to pressure are cylindrical and consequently of great strength. In addition to the cost of renewals being less expensive, and the saving of time in examination and repairs, obstructions in valves are easily located and removed without disconnecting water pipes.

Fig. 3 shows the centre packed ram series, an attractive type for all high pressure work. This pattern favors a short stretcher, the piston rod is cottered into the ram and the valve boxes are bolted to the working barrels, a combination of good features, enabling pump valves to be easily examined, and leakage by packing glands to be always visible. All parts subject to pressure are in this type also cylindrical, consequently it has the advantages enumerated for Fig. 2.

In a conversation with Mr. Attwood we learned that his valve motion is equally satisfactory on compound cylinders of his design, and that in the near future we will have the opportunity to illustrate this type for boiler feeding and other purposes. The "Bawden" pump is especially adapted to general marine service, among many reasons being the absence of lever valve motion enabling the longest stroke pump to be used, a consideration which every engineer knows to be the best for producing the highest and most constant vacuum at moderate piston speeds.

The "Bawden" Compound Pump.

Where greater economy of steam is desired, compound pumps embodying the same valve gear as used on the simple units, are of course recommended. The high and low pressure pistons work in one cylinder, the steam and exhaust ports being of the shortest possible length and so arranged that the high pressure steam never leaves the cylinder casting, while exhausting into the low pressure cylinder. There are no external passages, therefore, radiation and condensation are reduced to a minimum. Only one steam chest is required with one valve to distribute the high and low pressure steam, the whole forming a most compact, reliable and economical pump for boiler feeding, fire service and general purposes. The "Bawden" compound pump will run at speeds varying from the very slowest to the fastest without any mechanical adjustments for cushioning the pistons.

THE DE LAVAL STEAM SCALE AND DIAGRAM.

THE Mollier diagram is now generally well known to engineers as the most convenient means of determining, with all the accuracy reasonably required, the heat available from the expansion of steam from a given initial condition to a given final condition, and also for determining by comparison therewith the efficiency ratio of an engine or turbine of known steam consumption, or the quality of the steam at the end of expansion in a heat motor of which the steam consumption is known.

As the Mollier diagram is ordinarily arranged, however, its use is rendered difficult and its accuracy impaired by the fact that the total heat of the steam in the initial condition must be read off from the scale and the operation repeated for the final condition, after which the figures are subtracted one from the other and multiplied by 778 to give the available foot pounds, while to obtain other quantities involves several more tedious arithmetical operations.

All these difficulties are removed at one stroke by the use of the steam scale devised and published by the DeLaval Steam Turbine Co., of Trenton, N.J., manufacturers of single and multi-stage steam turbines for all capacities. This steam scale is a graduated measuring rule, bearing four different scales. The first, having uniform graduations, may be applied to the chart to measure directly the B.t.u. available between given initial and final conditions of the steam. A second edge of the rule bears a scale showing the resulting velocity of the steam when expended through a nozzle in feet per second, which may also, therefore, be read off at once, without computation. A third edge shows the duty in millions of foot pounds per thousand pounds of steam developed by a perfect engine working between the limits assumed, while the fourth edge gives the steam consumption in pounds per h.p. hour. Conversely, if the steam consumption of an actual engine be known, the last named scale enables the user to find the resulting quality of the steam at once from the diagram, without further measurement or computation. With this chart and scale in his possession, the engineer has the equivalent of complete steam and entropy tables, also tables for converting B.t.u. per pound of steam to jet velocity, steam consumption and duty without computation. The limits of error appear to be in general less than one per cent., and the accuracy is greater than this for some of the operations.

On the back of the chart are printed concise directions for using the scale, with an illustrative example. Copies of the scale and chart will be gladly sent by the DeLaval Steam Turbine Co., to engineers and others interested in the steam consumption of engines, turbines, etc.

QUEBEC DRY DOCK.

IT is understood that the Canadian Government has offered Sir John Jackson, Ltd., the contract for the construction of the dry dock at Quebec, which, when completed, will probably for many years be the largest structure of the kind in the world. It is to be 1,150 feet long, 137 feet wide, and 37 feet deep, while its cost, apart from buildings and repair plant, will be about $2,500,000.

The original intention of the Government was that the dock should be built and operated by a private company, in return for an annual subsidy of 3½ per cent. for 35 years on a minimum outlay of $6,250,000, but difficulties arose in connection with the tendering, and the scheme was abandoned.

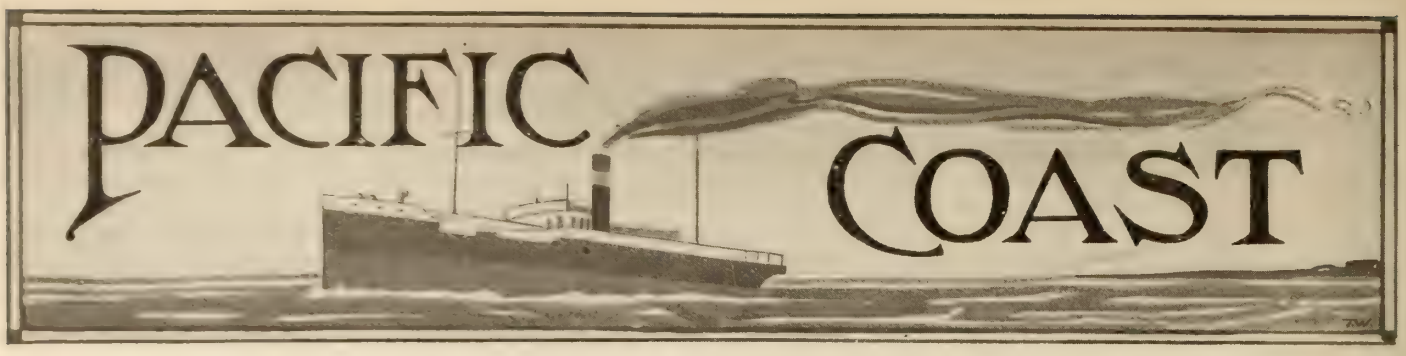
In addition to the dock, other improvements, such as more wharves, a large pier for ocean liners, and a considerable amount of dredging are to be made at Quebec, and the hope is entertained that when all these various facilities are available, underwriters will modify their attitude in the matter of marine insurance rates for the St. Lawrence, more especially as the floating dock at Montreal is now in operation, and as mammoth dry docks are to be built at St. John, N. B., and Sydney (Cape Breton).

FALSE LIGHTS.

IF the lighting of the St. Lawrence be in such primitive shape that a fisherman's lantern can be mistaken for a buoy-light, what would happen if a habitant lit his pipe on the shores of the St. Lawrence some dark and stormy night? The St. Lawrence route is not yet fully illuminated.—Ex.

PANAMA CANAL CONSTRUCTION ESTIMATES.

THE Panama Canal will be completed far below the estimated cost of $400,000,000, and may run as low as $375,000,000. The total amount of excavation work to September 15th is about 242,134,000 yards. The average rate of excavation a month is now about 2,500,000 yards. At the present rate of progress, all the digging should be finished before September 1st, 1913. The canal will have a summit elevation of 85 ft. above sea-level, to be reached by a flight of three locks located at Gatun, on the Atlantic side, and one lock at Pedro Miguel, and a flight of two at Mira Flores, on the Pacific side. Each lock will have a usable length of 1,000 ft. and a width of 110 ft., which will be the minimum width of the canal. The canal is to be about 50 miles long from deep water in the Caribbean Sea to deep water in the Pacific Ocean.



THE POWER BOAT.

By George Bulkeley, A.M.I. Mech. E.

IF a map be taken of British Columbia coast waters, and the relative positions of the Canadian cities of Vancouver, Victoria and Prince Rupert noted: also the location of the American Cities of Seattle and Tacoma, it will at once be patent that here is a cruising ground unexcelled in the world. Protected from the rough waters of the Pacific by a hundred miles of United States mainland, and by the full length of Vancouver Island, are some 400 miles of blue water, dotted with hundreds of green islands of all sizes, from twelve by seven miles in dimensions to mere tree-covered points of rock standing-up out of the sea. Most of these islands off the B.C. coast are inhabited; some have farms on them; some canneries and lumber mills; while on others, mining operations are being carried on. Between the above mentioned cities and the islands, there is a constantly increasing water-borne trade, while the work craft of the cannery and fishery companies, and the tow boats of the lumber mills form a fleet of small vessels which is being constantly and consistently augmented year by year.

Power Boats in Demand.

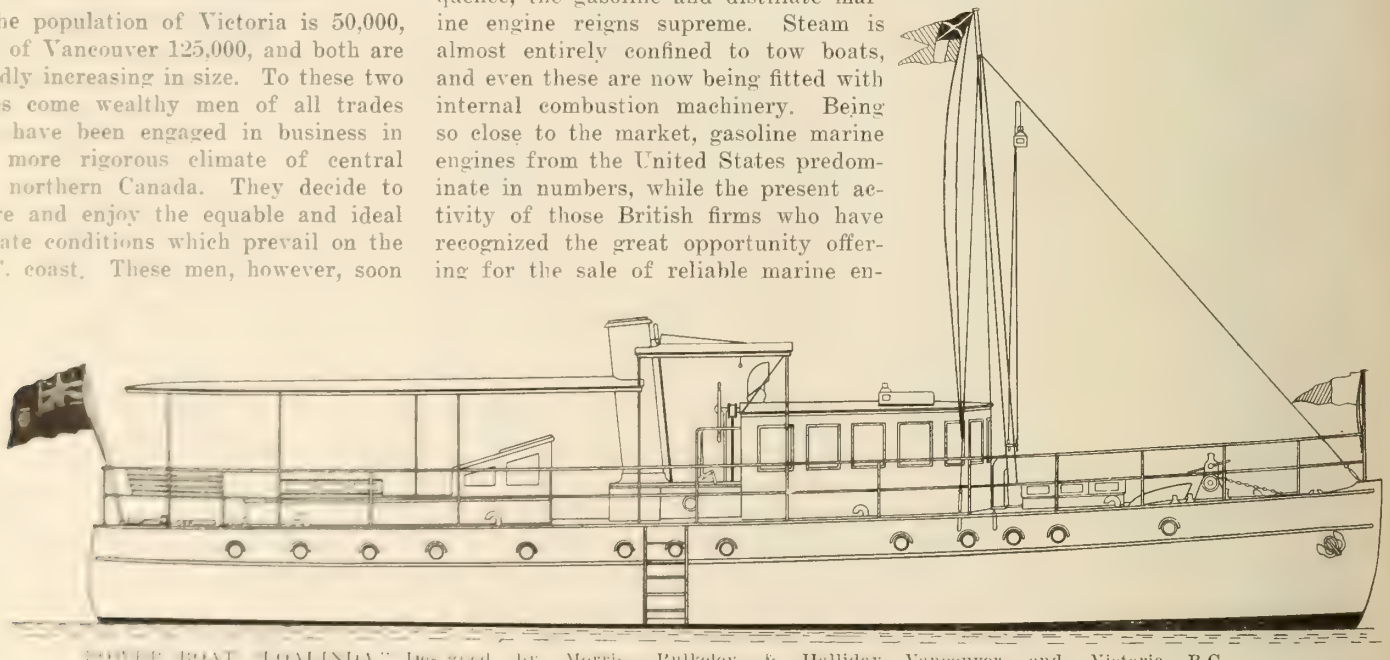
The population of Victoria is 50,000, that of Vancouver 125,000, and both are rapidly increasing in size. To these two cities come wealthy men of all trades who have been engaged in business in the more rigorous climate of central and northern Canada. They decide to retire and enjoy the equable and ideal climate conditions which prevail on the B. C. coast. These men, however, soon feel the spell of the sea and the islands, and many become enthusiastic owners of power yachts and cruisers. Again, the number of local business men in both cities who find the worry of business relieved by week end cruises and evenings spent on the water is eloquently testified to by the steadily increasing membership returns of the various yacht clubs. In such a geographical situation and under such conditions as outlined above, the small craft is bound to reach a high state of development. By "small craft" is meant vessels of such dimensions as place them in a contra-distinctive class to the great fleets of ocean-going steamships which carry passenger and freight traffic of the world, and which consist of such craft as tow boats from 50 to 150 feet in length; halibut fishery schooners from 60 to 100 feet; salmon cannery tenders of 60 to 80 feet; passenger and inter-insular freighters from 100 to 165 feet; large yachts from 60 to 120 feet; and, last but not least, that large fleet of private cruisers, smaller work boats, open launches, etc., from 20 to 50 feet overall length which throng the waters of this B.C. coast.

Here, then, is the field for the internal combustion engine, and, as a consequence, the gasoline and distillate marine engine reigns supreme. Steam is almost entirely confined to tow boats, and even these are now being fitted with internal combustion machinery. Being so close to the market, gasoline marine engines from the United States predominate in numbers, while the present activity of those British firms who have recognized the great opportunity offering for the sale of reliable marine engines in these waters would seem to presage a greater percentage of British engined craft than heretofore in British Columbia.

The Power Yacht "Loalinda."

As an example of the class of power yacht which is being designed and constructed on the B.C. coast, the accompanying drawing shows the twin-screw yacht "Loalinda," designed this year by Messrs. Morris, Bulkeley & Halliday, of Vancouver and Victoria, to the order of Mr. T. T. Langlois, president of the B. C. Permanent Loan Co. This yacht is 60 feet l.o.a., by 11 feet 6 inches beam, and 7 feet 3 inches moulded depth. Her waterline length is 58 feet; and she is powered with twin Buffalo gasoline engines, each having four cylinders of 6 inch bore by 7½ inch stroke, running at 350 r.p.m. The "Loalinda" makes a speed of 12 miles.

In general, the vessel is of the "flush deck" type, having no cockpits, and with cabins, engine room, etc., below decks. Taking the deck first, there is a navigating bridge aft of the wheel house, a steering wheel on the bridge, mechanically connecting with that in the wheel house. This latter compartment is partially sunk below deck level to avoid too much top hamper, and contains two



POWER BOAT "LOALINDA." Designed by Morris, Bulkeley & Halliday, Vancouver and Victoria, B.C.

lounge seats which are convertible to berths. A curved stairway leads down from the wheel house to the owner's quarters forward, which consist of a cabin containing a large 3 ft. 6 in. spring mattressed berth, one usual high berth with drawers underneath and a lounge seat on starboard side; the cabin opening out into a dressing room containing bath, toilet and wardrobes.

The engine room is located amidships. It has watertight bulkheads fore and aft and is entered by a hatch from the deck only. This arrangement eliminates most of the noise and odors which are inseparable from an engine room. The main fuel tanks are located on either side of the engine room; the whole of the power plant being thus centralized under the eye of the engineer, and the danger of fire greatly minimized.

The main saloon is aft of the engine room. It is exceptionally commodious, containing upholstered seats on three sides, convertible to sleeping berths, a folding table which is removable, and roomy sideboard and ice-chest to starboard and port respectively. Two fixed revolving chairs provide seating accommodation at forward end of dining table. The saloon toilet is on the port side of the stairway leading from deck to main saloon; while the galley is situated on the starboard side of same stairway. The galley has a good-sized coal (or wood) stove installed, with fuel space beneath stairway; also a sink, and dish and plate racks.

100 gallons of fresh water are carried in the main tank, which is coupled through pumps to two auxiliary 20 gallon tanks, both of which are piped (gravity feed) to all wash basins, bath, sink, etc. One of these auxiliary tanks supplies cold fresh water, the other hot fresh water, the latter being heated in a short time after starting the engines by the simple expedient of a thermal syphon arrangement; the heat being supplied from the exhaust pipe of the port engine. Trunks and skylights are situated over all below-deck accommodation, while portlights supply additional light and air when the weather is fine. An emergency fuel tank containing 150 gallons is located in after peak. This is not piped to engine room, but a special pump and hose have to be connected to it and the contents pumped into either of the main fuel tanks in the wings of the engine room. This arrangement ensures that the emergency tank cannot be drawn from, while the main tanks are full. In the emergency of the after tank's contents being requisitioned, the necessity of coupling up pump, etc., reminds both owner and engineer that it is time to run to port to take on fuel. Such an arrangement is a great safeguard in such waters as on the B.C. coast where a yacht may be many miles from a fuel station.

Proven Reliability.

Mr. Langlois ran up from Vancouver to Prince Rupert and beyond in this vessel last July, passing through the stormy waters of Queen Charlotte Sound. The entire success of this cruise adds yet another testimony to the fact that a properly designed gasoline yacht of moderate dimensions, and powered with a reliable make of engine, may both contain comfortable and convenient accommodation for her owner and his friends, and show a smart turn of speed, while being in every respect thoroughly seaworthy and able to hold her own comfortably in heavy weather. It is not so very long ago, when those who ventured out of sight of land in a gasoline powered craft were looked upon as bold and venturous spirits, but these days see a continued and consistent improvement in the reliability of internal combustion engines, and the adaptation of the best naval architectural practice to meet the requirements of small craft such as that illustrated. The inevitable result of all this development will probably be shortly demonstrated by the inauguration of power yacht races across the Atlantic and Pacific Oceans, the feasibility of which has been shown year after year by the success of the New York and Bermuda Race (which was won this year by a cruiser of only 40 feet overall length, the little "Dream," having successfully weathered a hurricane en route); and which has been finally proven by Mr. C. Flemming Day, the intrepid editor of "The Rudder," when he navigated the 35 foot "Detroit" from the North American Coast to Queenstown, Ireland, and now on to St. Petersburg, Russia.

C. N. R. STEAMSHIP "ROYAL GEORGE."

THE Canadian Northern Royal Mail steamer Royal George from Bristol to Quebec, with 900 passengers and a general cargo for Quebec and Montreal, ran on the rocks at high water on the afternoon of November 6, about 5.10 o'clock, one mile east of Point St. Lawrence, Island of Orleans.

The Royal George sailed from Bristol, England on Wednesday, October 30, to make her last trip in the St. Lawrence trade this season. She reached the Grosse Isle quarantine station early in the afternoon, and at 4.10 o'clock started for the port of Quebec, having a distance of 27 miles to cover before she could reach her moorings at the Louise docks. In order to reach port in time to allow a landing of her steerage passengers in compliance with the immigration regulations, she is reported to have come up at full speed. The river, it seems, was veiled with a thin fog at the time. After she struck, the passengers were in due course brought ashore in tugs, etc., and such of the baggage and freight as was possible of removal, was also disembarked.



C. N. R. STEAMSHIP ROYAL GEORGE

The Royal George and her sister ship the Royal Edward, are each 545 ft. long, by 60 ft beam, and of 12,000 tons register. Their triple turbine engines are capable of propelling the vessels at a speed of 20 knots per hour. Both were built at Glasgow by the Fairfield Shipbuilding and Engineering Co. As we go to press the Royal George is still on the rocks.

Sault St. Marie.—While running down lake Superior, the steamer L. L. Barth, owned by the Hinds Lumber Co. lost her deck load—100,000 feet of lumber, in a gale. The loss amounted to nearly $2,500.

MARINE ENGINEERING of Canada

A monthly journal dealing with the progress and development of Merchant and Naval Marine Engineering, Shipbuilding, the building of Harbors and Docks, and containing a record of the latest and best practice throughout the Sea-going World.

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Vol. II NOVEMBER, 1912 No. 11

THE WRECK OF THE "ROYAL GEORGE."

TO whatever cause the recent disaster to the Canadian Northern Steamship Royal George may be finally attributed, there is no shadow of doubt as to the impression now formed in the minds of not only shipping people, but of an intelligent general public, concerning the stigma attaching to the St. Lawrence route in the matter of reasonably safe navigation. The year 1912 has dealt harshly with the world's shipping, and the dire effects of its unkindly treatment in this as in other directions, make it such as to be remembered in many Canadians homes with anything but affection. It would seem as though all the effort put forth these last few years to improve the approach to our great ocean port of Montreal and put it on at least equality with other leading ports of this continent in every respect has been doomed to failure. In another part of this issue, reference is made to the St. Lawrence River and Gulf casualty record for the past season, and without the Royal George remaining on the rocks during an Arctic winter, as an awful example of the penalty meted out for stepping aside from a well-defined safe navigation course, we had already somewhat of a surfeit of near-tragedy marine happenings off our shores.

Report has attributed the stranding to different causes; yea, even the closing for the night, at sundown, of the immigration offices and passenger quarters is almost wholly blamed for the mishap. Than this latter, no more pure and unadulterated "bunk" has ever been conceived or written. A "searching" inquiry has been ordered to be held, and for the reputation of those conducting it and for the good name of our St. Lawrence River and Gulf, it is desirable that the real facts be adduced and the blame properly allocated. Let us hope also that some more feasible explanation will be given as to why the vessel was so far out of her course, than that of a fisherman's lantern being taken for a navigation light. We have been accustomed, as Canadians, to feel rather proud of the provision made by the Department of Marine and Fisheries for the guidance and direction of our shipping, and let us hope that the Court finding will show that provision to have been ample and efficient in this particular instance. The evidence to be secured at this investigation and the decision of the assessors bearing on same has a wide interest for and may possibly determine a course of action by underwriters inimical to Canadian shipping interests. This being the case, those deputed to conduct the inquiry should be thoroughly impressed with the responsibility which rests upon them.

It may not be out of place to remark here, for the benefit of those concerned, i.e., those interested in attempting to refloat the Royal George, that the good ship Bavarian, which also went ashore a few years ago below Quebec, was ultimately floated at enormous expense, and penultimately and quite quickly thereafter went to the scrap heap in spite of her change of location. It is more than probable that the Royal George is well on the way through the first, although perhaps not final stage towards scrapping.

THE STANDARD OF SEAWORTHINESS.

RECENT disasters to vessels on our Eastern inland waters have drawn attention to the question of the seaworthiness of many of the comparatively small craft which ply their passenger and freight calling there. Doubts are expressed not only regarding the equipment detail being all that it should be, but what is perhaps more important, concerning the structural ability of the hulls of these vessels and their power equipment to weather the seasonable storms, particularly those of the autumn, to which, on lakes and rivers, great and small, are more or less supplied. There is no getting away from the fact that the general appearance of many of our privately owned trading craft, particularly, impresses one with a sense of their venerableness, and gives rise to the thought that no harm and much good would accrue from their disappearance from the Canadian Register.

Our country is not lagging in the world's march of progress, as touching affairs manufacturing and transportation on the solid earth, and there is surely no reason why at least an equal relative standard should not be maintained in our marine equipment. We have now several well equipped shipbuilding and marine engineering plants established in various parts of the Dominion, and their ability to turn out first class and seaworthy ships has been amply proved.

There is required, we believe, a much more searching inspection and examination into the general fitness of many vessels by the Department of Marine and Fisheries, under whose jurisdiction they live, move and have their being, not so much for the purpose of finding out if they are properly equipped with lifeboats, lifebelts, compasses, lamps, etc., but to ascertain if they have not over-survived their usefulness and have become a menace to life and property. The disasters referred to will not have been altogther in vain, if increased activity on the part of those responsible results in the impossibility of similar and distressful happenings in the future.

MARINE ENGINEERING OF CANADA.

TO keep in touch with developments in Canada's mercantile and naval marine, as also those taking place in other maritime centres throughout the world, every man, directly or indirectly connected with the business of shipping in its various aspects, will find "Marine Engineering of Canada" to be not the least valuable contribution to his education and enjoyment.

Marine News From Every Source

Halifax, N.S.—The Dominion Coal Co. tug Douglas H. Thomas was run down by the City of Sydney as the two were steaming down the harbor on the night of November 13. The city of Sydney, in some unexplained manner caught the Thomas amidships. She heeled over and began to fill and the captain sent her full speed astern to prevent her sinking. Four of the Douglas H. Thomas' men are missing, and it is feared they fell overboard and were drowned. The vessel, though full of water, seems to be little damaged, while the City of Sydney is not damaged at all.

Sarnia.—This year has been a very successful one for the Northern Navigation Company, and a record has been established for the fall. Formerly, the steamers were put on ten day's service immediately after the tourist season, but this year it was decided to maintain the summer service of three steamers per week during the entire season. The consequence naturally is that, instead of the usual congestion of freight, every steamer makes a clean-up. The Hamonic, the largest of the line, sailed on November 16, with a full cargo, and not a pound of freight was left on the dock. That the shippers more than appreciate this service is evidenced by the increased volume of tonnage moving via Point Edward this year.

Montreal.— Twelve persons perished and four only were rescued, when the steamer Cecilia L. went to pieces on a shoal in the narrow channel between Beauharnois and Isle Perrot at the mouth of the Chateauguay River on Lake St. Louis during a gale on Friday, evening November 1.

Montreal.—The Thomson Liner Bellona, from Montreal, for east British ports, ran aground on Wednesday night, October 30, in the Upper Traverse below Quebec. The Bellona sailed from Montreal with a full cargo, on October 29, and while passing through the Upper Traverse she grounded for some unexplained reason.

Collingwood.—The new lighthouse steamer Estevan, which the Collingwood Shipbuilding Co. have just completed to the order of the Dominion Government for the service on the Pacific Coast, left on November 4 for her 17,000 miles trip to Victoria, B. C.; a voyage estimated to occupy three months. A few days before her departure the steamer was taken to Owen Sound, where trials of speed were made over the measured course, and throughout the tests the vessel acquitted herself admirably. The log showed a speed of fourteen knots per hour, two knots more than the contract with the Government calls for. The Shipbuilding Co. are under contract to deliver the steamer at Victoria, B. C. This necessitates the engagement of two crews, one to take her to Quebec, and another to make the ocean voyage, down the Atlantic Ocean, round Cape Horn, and up the Pacific Coast to her destination. From Collingwood to Quebec the steamer was in charge of Captain Lachlan Morrison, an experienced lake captain and pilot. At the ancient capital, Captain Morrison turned his charge over to Captain Lindgren of Victoria, B. C., who in recent years has taken three C. P. R. steamers, the Princesses, from England to Victoria.

Welland.—Saturday, November 2, was the eighty-third anniversary of the passage of the first vessels through the first Welland Canal, from Lake Ontario to the Welland River at Port Robinson, thence via the river to Chippewa and Niagara River to Buffalo. Between Port Dalhousie and Port Robinson there were forty wooden locks, 109 feet long and 22 feet wide, with a depth of 8 feet, costing $2,750 each. The locks of the newer or third enlargement of the Welland Canal will be 900 feet long, 32 feet width, 30 feet in depth, and will cost $1,000,000 each.

Midland.—The Government steamer, Lambton was in Midland recently, arranging for the construction of another lighthouse in connection with the steamer service at Port McNicoll. The present light will only be a temporary affair, and during the winter, the two present lights will be removed and one of large range substituted.

Montreal.—It is announced that work will shortly be commenced on the enlargement of the G.T.R. elevator at Windmill Point, Montreal harbor, by the addition of storage bins for a further 700,000 bushels, giving it a total capacity of 1,700,000 bushels.

Quebec.—The act creating a new harbor commission for Quebec, to consist of three members, displacing the former board of nine, came into effect, October 13, by proclamation. The new board, according to local press reports, will consist of W. Price, chairman, J. B. E. Letellier and A. Gravel.

Port McNicoll.—Application has been made to the Government Department of Marine and Fisheries to send an ice breaker to Midland to prevent the formation of ice at Port McNicoll. The Department will make arrangements to that effect, which will help in prolonging the season of navigation beyond December 15, and also aid in the progress of steamers going to Port McNicoll. A despatch from Ottawa says that a new plan to help prevent a western grain blockade will be put into effect by the C. P. R. this year. The Canadian Pacific is making preparations to have a whole fleet of steamers loaded with wheat at Fort William just at the close of navigation. They will be rushed down the lakes to Port McNicoll on Georgian Bay, where they will tie up for the winter season, and serve the purpose of giving added storage capacity. As the grain is moved from the elevators at Port McNicoll during the winter and sent down east by rail, the cargoes from the steamers will be dumped into the elevators and thus increased amounts to former years can be taken from the elevators by rail. By the close of navigation, the Port McNicoll elevators will be filled to their utmost capacity, while this flotilla of steamers loaded with grain will be at the wharfside, and the C. P. R. believes the plan will aid materially in preventing a blockade.

Nanaimo.—The Nanaimo Navigation Co. propose having the boats built here for their Vancouver Island trade.

Goderich.—The body of a young man, with a life preserver marked "Str. Fleetwood," was found on the shore of Lake Huron, about twenty miles north of here. There was nothing to identify the body. Two lives were lost when the Fleetwood was sunk in a collision recently.

Montreal.—Commander H. St. G. Lindsay, Dominion Wreck Commissioner, intimates that as a result of his enquiry into the recent sinking of the steamer Keystorm in Lake Ontario, he had decided to recommend that the master of the vessel be suspended for one year and the mate for two years. It was evi-

dent, Commander Lindsay said, that there had been carelessness in navigating the vessel, which went to the bottom two hours after she struck. The Keystorm foundered in Lake Ontario, near Black Island. She was a mile southwards out of her course when she sank. No lives were lost.

Point Edward.—The Northern Navigation Co. will make large additions to its buildings and docks at Point Edward, so that it can handle freight with better speed. The company will spend $50,000 during the winter in concentrating its buildings at the Point and in moving different departments to the Sarnia end of the line.

Fort William.—A considerable amount of dredging has been carried out in Fort William harbor during the present year. Since the opening of navigation, seven large dredges and three clam-shells have been working continuously, and it is estimated that between 30,000 and 40,000 cubic yards of solid earth have been dredged each day, in the deepening and widening of the channels. The McKellar River has been dredged its whole length, widened from 95 feet to about 400 feet, and deepened to 25 feet. The Mission River has been widened from 300 feet to 500 feet throughout its length, and deepened to 30 feet. The Kaministiquia River has been widened by 100 feet from the Mission turning basin to Thunder Bay, and is now 500 feet wide, with an average depth of 30 feet.

Port Arthur.—The keel of the new steamer for the Northern Navigation Co. was laid on November 4.

Season of Navigation.—The Underwriters and Great Lakes Protective Association have been asked to extend the season of Navigation covered by insurance to December 10. The argument in support of the request is the unprecedentedly large grain crop of the West much of which the belated harvest has delayed being brought forward until late in November.

Fort William.—The steamer Willis King left Fort William recently with 425,000 bushels of wheat, the largest cargo of the kind which has ever left a lake port. The record before was 405,000 bushels, part of which was flax. This is the boat's first trip to the head of the lakes.

Port Stanley.—The Windsor Dredging Co. has been awarded a contract for dredging at Port Stanley. The expenditure will be $17,000.

Vessel Abandoned.—The steamer Hayward which sank at Harbor Beach, Mich., last November, has been abandoned after several attempts to save her. The engines, pumps and other equipment are being carried away as salvage. The Hayward, built in Manitowoc in 1886 was 130 feet in length, 28 feet in breadth and ten feet deep. Her cost was $32,000. In 1908 the steamer was rebuilt at a cost of $6,000. The present loss will be about $12,000 and falls on Capt. La Croix of Mt. Clements.

Quebec.—Captain Saunderson, of New York, and Captain Parry-Jones, of Cleveland, Ohio, recently visited the stranded C.N.R. steamship "Royal George" with a view to making arrangements for refloating the vessel. We understand that they have confidence in carrying out the project to a successful issue.

Halifax.—The Dominion Coal Co. is reported to have decided to carry out considerable improvements in connection with its coaling plant at Halifax. The present sheds there are to be cleared away, and the latest appliances for handling coal to and from vessels are to be installed. Three towers are to be erected, of wood and steel, running on rails along the wharf. Each tower will be 90 ft. high, and have a 65 ft. boom attached to a clam bucket arrangement with capacity of at least one ton of coal. With these towers working, it is estimated that 200 tons of coal can be taken from a vessel each hour, and 1,500 tons bunkered in 10 hours.

TEN MILLIONS FOR HARBORS.

PUBLIC Works main estimates this session will provide about ten million dollars for harbor improvements next season at St. John, Quebec, Toronto, Port Arthur, Vancouver and Victoria. The new terminal scheme at Halifax will be looked after by the Railway Department, while the Montreal harbor improvements are financed under special arrangements with the Harbor Board.

THE ERIE CANAL

THE 1912 season on the Erie Canal, which ended at midnight of Nov. 16, was one of the best experienced in many years, despite the fact that navigation was suspended for six weeks during September and October through a break which occurred at Bushnell's Basin, Never in the history of the local ports has so much gravel been forwarded from Tonawanda by the canal as during the past season. The pig iron shipments were lighter this year than last, but coal shipments were a trifle larger in 1912 than in 1911. The season's shipments were: Lumber, 82,336,619 feet; gravel, 113,085 tons; pig iron, 112,640 tons; coal, 43,600 tons.

TORONTO HARBOR IMPROVEMENT

MR. R. S. GOURLAY, ex-president of the Board of Trade, explained the plans of the Harbor Commission for the improvement of the Toronto harbor and water front to the members of the Board of Trade a few days ago. He said the Harbor Board had found no easy task in bringing order out of chaos when they came into office. Ordinary shipping facilities were lacking, and access was available to the water front at only one central dock. About one and a half square miles of the southern front of the city was covered by a shallow sheet of water, and "we found ourselves," said Mr. Gourlay, "in possession as managers of a neglected estate, with its business asleep and most of the windows still covered by shutters that the city had been too busy to remove."

The following details give in compact form an idea of the extent and benefits of the proposal.

The New Harbor.—Will be modern, with a uniform depth of water capable of accommodating any vessel with a draught of 24 feet.

Rail and Water Traffic. — Provision made for proper co-ordination of rail and water traffic at the three industrial sections, namely: around the foot of Yonge, Bathurst and Cherry Streets, in order to properly develop the port.

Industrial Sections — An industrial area of 644 acres of available land in Ashbridge's Bay district, to be known as the Toronto Harbor Industrial District, capable of accommodating factory buildings with a value of $30,000,000 and producing a ground rent revenue of $500,000 a year.

Docks—Modern and permanent docks served by 24 feet of water and equipped with freight sheds, warehouses and appliances, will be located along the central waterfront and at the foot of Cherry and Bathurst streets. The west face of the industrial district also will have a dock area capable of development so as to provide an additional dock frontage of three miles.

New Channels—A ship channel 6,800 feet long, 400 feet wide and 24 feet deep, with turning basin 1,000 feet square at its east end serving the industrial district and the eastern portion of the city generally, and equipped with three miles of dockage.

New Park Areas—A total area of 894 acres of new park lands will be added to the city. There will be additional park areas on the Island totalling 352 acres; a new lakefront extending from the Eastern Channel to Woodbine avenue; 190 acres in district from Bathurst Street to the Humber River on the waterfront; a public playground covering 3½ acres east of the foot of Roncesvalles avenue, and a public square west of Roncesvalles aveune.

Boulevards, Driveways, etc.—A lake-front boulevard system of driveways, bridle paths and walks across the water-front for eleven miles; a terrace promenade 6,880 feet in length and 55 feet wide from Sunnyside to the Humber; a double-deck combined traffic and recreation pier 300 feet long and 20 feet wide in front of the Exhibition Grounds; a new lakeshore road 66 feet wide, from Humber River to Sunnyside.

Bathing Beaches — A bathing beach one and one-third miles in length from Sunnyside to the Humber; a similar beach four and one-quarter miles in length from the Eastern Channel to Victoria Park.

Protected Waterway — A protected waterway twelve miles in length from east to west along the city front; a protected waterway with an average width of 600 feet behind a breakwater from Woodbine Avenue to the east city limits.

Provision for Aquatic Clubs—Inside breakwater extending from Eastern Channel to Woodbine Avenue will be ample accommodation for east end aquatic clubs. A location for aquatic clubs 1,000 feet long and 300 feet wide north of the new Western Channel with an anchorage basin of absolutely protected water covering 42 acres. A similar location at the foot of Roncesvalles avenue 800 feet long and 250 feet wide fronting on the protected waterway formed by the western breakwater.

The Cost.

To Harbor Commission.....	$11,215,920
To Dominion Government....	6,123,284
To City of Toronto	146,500
To city for park and boulevard to be made later, add	1,656,383
Total	$19,142,088

IMMENSE SHIPPING COMBINE.

A REPORT from New York says, "It is asserted with great circumstantiality in financial circles that preliminary negotiations have been completed to form the greatest shipping combine the world has ever seen, one which in point of tonnage, capitalization and resources, would dwarf J. Pierpont Morgan's International Mercantile Marine.

The companies pooling their interests are:—

The Cunard, with a capital of $10,000,000 and 31 steamers.

The Peninsular and Oriental, capital $17,500,000, and 64 ships.

The British India Steam Navigation Co., capital $8,500,000, and 129 steamers.

The Royal Mail Steam Packet Co., capital $60,000,000, and 129 steamers.

Furness, Withy & Co., capital $17,500,000, and 63 steamers.

Sir Owen Phillips is carrying out the deal.

This is the shipping trust which the Canadian Associated Press London cable referred to in connection with the report of a proposal to be made to shareholders of the Richelieu and Ontario Navigation Co.

Not long ago, also, there was a story circulated to the effect that the C.P.R. was about to take over the P. & O., which is included in the above list.

The combined capital given above is $113,500,000, and the vessels number 416.

WIRELESS ON THE GREAT LAKES.

THE value of wireless telegraphy for passenger steamers on the Great Lakes was given a practical demonstration during Sunday night, November 3, says the Daily News, Port Arthur, the incident being the most notable of the kind since the installation of the wireless system on the Northern Navigation and Canadian Pacific lake steamers this season.

Shortly after leaving Sault Ste. Marie the Canadian Pacific flagship Assiniboia lost two blades from her propeller. A heavy gale was blowing at the time and the captain decided to hug the north shore instead of making the run straight across the lake as usual. On the lake at the same time was the Northern Navigation Company's flagship, the Hamonic, and when the Assiniboia lost the blades from her propeller, information regarding the situation was immediately conveyed to the Hamonic. The Hamonic continued in mid-lake course, but ran under check so as not to get so far from the Assiniboia that she could not render early assistance if needed. The wireless operators on the two steamers were in constant communication, while the boats remained out of sight of each other, about fifty miles apart. The Port Arthur Marconi station was also in touch with the steamers all through the night, and the fact that help could have been rushed at a moment's notice, from different directions, was a source of great satisfaction to all concerned, especially to those on board the Assiniboia.

The Canadian Pacific liner weathered the gale, even minus the two propeller blades, and arrived in Port Arthur only a few hours late, the Hamonic following her into port a short time after.

SHIPPING DISASTER COSTS.

The loss occasioned by the more important shipping disasters during the first nine months of the present year amounted to about $30,000,000, the total for September being $2,272,500, mainly owing to the Japanese typhoon. Since the beginning of January there have been no fewer than 4,241 casualties to vessels of 500 tons gross register and upwards, collisions being responsible for 1,352, strandings for 1,270, and weather damage for 794. Moreover, 172 vessels, of 302,900 tons were totally lost, and of these 63 were British and 109 foreign.

OIL BUNKERING ON MOTOR SHIPS.

ONE of the great advantages of the motor ship over the steam ship is the ease and rapidity with which it can take on fuel, and of course this particular advantage applies also to steamships in which oil is burnt under the boilers. This matter will become one of essential importance to warships, and recent trials with oil bunkering on battleships going at high speed have brought out some interesting facts. Apparently the most modern and biggest of battleships are able to take on oil when travelling at a speed of nearly 20 knots, towing behind them the oil-tank vessel from which the oil supply is obtained. We believe it is possible to take on about 100 tons per hour when travelling at this speed, and as 100 tons of oil fuel on a motor ship is equivalent to about 400 tons of coal or more, the importance of this point can be at once realized.

Brass hose of about 5 in. diameter is generally employed, this having been found best for all purposes. The distance of the ship from the tanker is generally about 200 yards.

ANOTHER LOCK ACCIDENT IN WELLAND CANAL.

A SERIOUS accident and break in the Welland Canal occurred about two o'clock on the afternoon of Nov. 1, when the steamer Samuel Marshall, owned by the Central Canada Coal Co., of Brockville, carried awa ythe four gates of lock 13, and badly damaged the bridge crossing the canal a short distance below the lock. The Marshall was bound up, light, and on entering the lock rammed the two head gates, throwing them apart and letting the waters of the upper level rush through; tearing the upper and lower gates from their sockets and forcing the steamer back against the bridge which crosses the canal. The working gear of the bridge was badly wrecked, and the bridge thrown out of position, blocking all travel along the road. Fortunately, the level above is a short one, and there was comparatively little damage to the canal banks or surrounding country. The steamer escaped without serious damage. The pontoon, with new gates, from Port Dalhousie, was at once hurried up to the break.

There has been an unusual number of accidents this season on the canal, this being the fifth time that gates have been carried away.

PANAMA CANAL AND CANADIAN COASTING VESSELS.

THAT the Government and Parliament should send a protest to the British Colonial Office against the manner in which the United States proposes to discriminate against Canadian coasting vessels using the Panama Canal, in favor of their own was the opinion expressed by Sir George Ross in his address to the Canadian Club at the luncheon given recently in Toronto, at McConkey's restaurant, over which Mr. T. A. Russell presided. Sir George considered that the proposal to charge tolls against coasting ships using the canal and to rebate the amounts paid by United States boats constituted a violation of the Hay-Pauncefote Treaty which guaranteed that the waterway should be free and open to vessels of all nations on terms of entire equality. He suggested that Canada should not resort to retaliation, which was a mean sort of warfare. She should make her remonstrance to the Colonial Office, and if that proved ineffectual should carry an appeal to The Hague tribunal. The intimation that the United States might not consent to a reference to The Hague he considered as an indication that that country recognized that it was in the wrong.

Sir George outlined the history of the proposal to join the waters of the Atlantic with those of the Pacific by a canal across the Isthmus of Panama. As early as 1531, the Spaniards had surveyed the route for such a waterway. In 1850, a treaty between Britain and the United States provided that neither country should construct the canal and "securing forever the free and equal rights of navigation of such canal to all nations." "So you see," said Sir George, "both Britain and the United States pledged their honor by treaty that they would deal on equal terms with each other and with other nations."

History of the Canal.

A private company was organized to build the canal, and in 1890 construction was begun under Count de Lesseps. The project failed. In the meantime, the United States had grown prosperous, and wished to open the canal as a national undertaking. They secured the abrogation of the earlier Clayton-Bulwer Treaty and the substitution of the Hay-Pauncefote Treaty, permitted them to do so in 1901. Speaking at the time and in 1904, President Roosevelt had declared that the canal was for neutral use by all nations. The same view was expressed in the Senate and the House of Representatives, and the treaty itself declared "that the canal should be free and open to vessels of commerce and of war of all nations observing the rules on terms of entire equality."

Evading the Treaty.

Last year, President Taft had sent a message to Congress asking instructions respecting the policing of the canal. Then the question arose: "Is the trade of the United States to be governed by the treaty?" Sir George said that apparently some members of Congress believed that the United Sates were included in the expression "all nations" in the agreement. Messrs Root and Lodge maintained that this view was contrary to the spirit and letter of the treaty, but the latter maintained that it would be posible to pay a subsidy to United States ships in lieu of giving them advantages in tolls. He also maintained that it was not necessary to give Canadian coasting vessels the same rights as United States ships.

Sir George recalled that when the Welland Canal was opened, a toll of 20 cents a ton was charged, and Canadian vessels received a rebate of 18 cents. The United States considered this a violation of the Washington Treaty. Citizens of that country declared it "unfair treatment of a friendly nation" and "discrimination against the United States." If this action of Canada was "discrimination," what should be said of the action of the United States in 1912? Senator Ross told the audience that when the Canadian Government granted a rebate to Canadian vessels using the Welland Canal, President Harrison at once issued a proclamation imposing a toll of 20 cents a ton on all cargoes passing through the St. Mary's Canal on their way to Canadian ports.

R. & O. TERMINALS AT FORT WILLIAM.

THE Richelieu & Ontario Navigation Co. is planning extensive terminals in Fort William where it has a water frontage of over 1,500 feet on the Kaministiquia River, at the point where the Government is dredging out a turning basin. This land, which is quite deep, and adjoins the Canadian Car location, runs right back to the industrial railway, which is operated for the benefit of all those owning lands along the harbor frontage.

The harbor frontage which the Richelieu Co. now owns, was purchased by one of its subsidiary companies, the Inland Lines, about two years ago. Hitherto the vessels of the Company have been forced to call at each of the three railway companies' docks to unload freight, and then later have to call back at the same docks to reload; but with the building of a terminal and docks this will all be changed. The company's boats will make right for their own wharves where they will berth and unload. Freight for the various railroads will then be sorted out and carried by the Industrial Railway to the different depots. Similarly, eastbound freight carried over the railway lines from the West, but consigned to the Richelieu steamers, will be carried by the Industrial Railway to the terminal where it can be immediately loaded on to the company's vessels, thereby cutting off several hours each trip. The length of water frontage will permit of three of the largest type lake vessels yet built being loaded at once. Just how much money will be spent at the present time on this terminal has not yet been announced.

EXTENSION OF NAVIGATION.

STEPS to keep navigation open on the lakes as long as possible are being taken by the Dominion Government. The Minister of Marine, and Col. Anderson, chief engineer of the Department. The Minister of Marine, and Col. with shipping men, and a contract has been closed with the Great Lakes Dredging Co. for the operation of their ice-breakers at Port Arthur and Fort William. Negotiations respecting the extension of the insurance season are now in progess.

WIRELESS STATION AT SARNIA.

A POWERFUL wireless station is now being constructed at Sarnia by the Dominion Government and it is expected to be in working order before the closing of navigation. With a tuning radius of 600 miles, the outfit can keep in touch with any place on Lake Huron, and also with Ottawa, North Bay and the Soo, besides stations on Lake Superior. The machinery is now being installed, and when the aerials are finished, messages can be received from ships fitted with wireless. The steamers of the Northern Navigation Co. and many other boats of Canada and the Unites States have the necessary outfit. Three operators will be in charge of the Point Edward station, which wil be operated by the Marconi Wireless Co of Canada.

RAILWAY AND OCEAN TERMINALS AT HALIFAX.

NO announcement ever made in the city of Halifax was so important to it, as that of Hon. Frank Cochrane, recently, at a luncheon given in his honor by the business men of Halifax. The minister of railways announced the intention of the government to build new railway and ocean terminals nearly two

miles south of the present terminals and far eclipsing them in magnitude.

The new docks, the minister stated, are to extend for one and a half miles from the lumber yard at Point Pleasant Park, and will consist of six piers 1,250 feet long and 300 feet in width with capacity sufficient to dock at least 30 ships. There will be one bulkhead leading pier 2,000 feet in length at which ocean greyhounds may land. This pier will be equipped with immigration buildings, sheds and a grain elevator. A new union passenger station will be erected at the end of Hollis street just north of the docks mentioned, which will be of ample size and suitable architecture.

Terminals Approach.

The new terminals will be approached, the minister went on to say, by a double tracked railroad which will branch off the main line at the Three Mile House and extend southward through the low divide between Bedford basin and the head of the north-west arm. It will then skirt the arm in such location as will do the least damage to property in that vicinity, avoiding all level crossings and for the most part passing through deep cuttings so as not to mar the beauty of that district, and finally reaching the terminals by passing under the lower end of Young avenue. The streets in the residential district where the railway is submerged will be carried over the cutting on artistic bridges in keeping with the present surroundings.

No statement was made as to cost, but it is generally conceded that the present works will involve an expenditure of some thirty million dollars.

LLOYD'S REGISTRY RETURNS.

THERE has just been issued by Lloyd's Register of British and Foreign Shipping the returns of vessels totally lost, condemned, etc., from April 1st to June 30th, 1912. Thirteen principal maritime countries are shown, besides other smaller states. The total steam and sailing tonnage owned by each of these countries is given. British tonnage, including the Colonies, heads the list of lost steamers, the number being 20, with a gross tonnage of 82,138 tons. The next is Norway, with a gross tonnage of 7,445. The return of all countries shows that three were lost by being burnt, five by collision, five foundered, ten missing, and 24 wrecked, giving a total tonnage of 112,773 tons.

Of the sailing vessels lost, condemned, etc., the United States heads the list with 11 vessels of 4,522 tons; Great Britain and Colonies, 11, with 3,640 tons. Norway, although only losing eight vessels, exceeds in tonnage, which amounts to 9,016. The total number of vessels of all countries lost numbered 49, with a tonnage of 24,846 tons, made up as follow:—Abandoned at sea 6, of 2,346 tons; condemned 1, burnt 3, of 800 tons; collision 6, of 1,308 tons; foundered 2, of 252 tons; missing 5, of 5,102 tons; wrecked 25, of 13,917 tons.

Vessels under 100 tons are not included in returns of either steam or sailing vessels. The total number of steam and sailing vessels lost over 100 tons, of which the return is made, totals 97, with a tonnage of 137,619.

WRECK COMMISSIONERS INQUIRIES.

S.S. Eric.—Commander H. St. G. Lindsay, Dominion Wreck Commissioner, assisted by Captains N. Hall and J. W. Harrison, recently delivered the following judgment concerning the stranding of the British steamship Eric on Sable Island, N.S., August 14:

After reviewing the evidence, which, on account of all log books, documents, etc., being lost, was given entirely from memory, the court finds that the vessel was well found and apparently navigated in a proper and seamanlike manner, up to the morning of August 14. That the cause which led to the stranding was owing to the master, W. G. Corner, being over confident as to his position when approaching and trying to make such a well-known danger as Sable Island. Presuming his position on August 13 to be correct, he showed very poor judgment on finding the water shoaling so perceptibly, by not taking another cast of the lead or hauling off to the eastward, or stopping his vessel until the weather cleared so that he would be able to find out his position. The court, therefore, suspends his certificate for three months from August 26. The court also criticized the want of co-operation by the officers in the working up of the vessel's position.

S.S. Lake Champlain.—Commander H. St. G. Lindsay, Wreck Commissioner, assisted by Captain F. Nash and T. Perron, pilot, as nautical assessors, delivered the undermentioned judgment concerning the stranding of the C.P.R. s.s. Lake Champlain, in the St. Lawrence River, near Dominion Park, Montreal, September 3.

The cause which led to the stranding was an error of judgment on the part of L. Z. Bouille, the pilot; being deceived by the glare of light from the north shore, in calculating his distance from Longue Pointe buoy on rounding same, and on account of the leading lights and all other lighted buoys in the channel to the westward being obscured by smoke or passing mist. The court is of opinion that, under the circumstances, it is not necessary to deal with his license, but recommends that greater care should be exercised in future under all conditions, and speed reduced when any uncertainty as to the position of the vessel prevails. The court also suggests that seeing the conditions which prevailed at the time of the accident with regard to lights being obscured are not unusual and are not likely to improve, range lights to the eastward, if such could be arranged, would be of great service under similar weather conditions, for vessels either up or down bound. It also recommends that compass courses be used when applicable in navigating the long stretches of the river, being of opinion that had a compass course been set after rounding Longue Pointe buoy, the accident would in all probability not have occurred.

NAVIGATION LIGHTS.

ALL Canadian lights and fog alarms on Lake Superior will be kept in operation this autumn until 15th December, or later if the season of navigation will permit, with the exception of Caribou Island, Otter Island, Michipicoten Island; Gargantua, Michipicoten Harbor and Corbeil Point lights, from which stations the keepers may be removed at any time after the 1st December. Mariners must not rely on finding any of these lights in operation later than the dates above specified for closing.

All Canadian lights and fog alarms on Lake Huron, Georgian Bay, Lake St. Clair, Lake Erie, Lake Ontario and connecting waters will be kept in operation until the 15th December, except South-East Shoal Lightship, Lake Erie, which may be removed from her station not earlier than the 5th December; also Lonely Island lights in Georgian Bay, which may be closed and the keeper taken ashore on the 5th December.

All Canadian lights on the River St. Lawrence will be kept in operation as long as navigation is open, and all gas buoys, both on the River and Great Lakes, will be kept at their stations as long as ice conditions permit, and where it is necessary to remove the buoys before the close of navigation, spar markers will be laid down if possible.

Lightkeepers and mariners will govern themselves accordingly. Lightkeepers are cautioned to maintain their lights until the dates specified for their respective districts, and later, if navigation remains open.

Kingston. — During October passes were issued at the local canal office for 1,765,632 bushels of grain en route to Montreal. During the month also 8,226 tons of coal arrived here from Lake Ontario ports.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals who Have Been More or Less Prominent in the Marine Sphere

Mr. John Platt has been appointed assistant weighmaster at the Port of Goderich.

H. B. Smith, of Owen Sound, Ont., is reported to have been elected a director of the Richelieu & Ontario Navigation Co.

Sir Christopher Furness who is popularly believed to have been the moving spirit in the recent merger of various lines of inland navigation in Canada, died recently.

William H. Durham, a well known engineer, of Grantham Township, residing near Homer, died recently. During the summer months the late Mr. Durham served as engineer on the steamer Pellatt.

Mr. George Hannah, for the past 20 years general passenger agent of the Allan Line, and for 45 years associated with the shipping business in Canada, has announced his impending resignation from the Allan employ.

Capt. J. L. Baxter who sailed the steamer Forest City between Silver Islet and Fort William during the past summer, was presented with a gold watch by the cottagers at the former place. The popular captain belongs to Owen Sound .

A. Johnston, Deputy Minister of Marine, on his return from an inspection trip around the Magdalen islends, Anticosti, St. Pauls, and the north shore of the St. Lawrence, recently, is stated to have recommended a more modern light than is at present being used for buoys, range lights, etc.

Mr. S. Brisbane, who has been chief engineer on various vessels of the Northern Navigation Co., for a number of years, and later, chief engineer of the Hamonic, has been appointed shore engineer. He will spend most of the winter at Port Arthur, overlooking the building of the company's new vessel [illegible]

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont., Captain M . McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclavia Street, Kingston, Ont.; Captain T. J. Murphy, 111 William St., Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy St., Kingston, Ont.; Captain James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rideau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston. Ont.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.

President—James Playfair, Midland; Counsel—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.

Chairman—W. F. Wasley, Gravenhurst, Ont.
Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.

President—A. A. Heard, Albany, N.Y.
Secretary—M. R. Nelson, New York. .. ....

THE SHIPPING FEDERATION OF CANADA

President—A. A. Allan, Montreal; Manager and Secretary—T. Robb, 526 Board of Trade, Montreal.

SHIP MASTERS' ASSOCIATION OF CANADA.

Grand Master—Capt. J. H. McMaugh, Toronto, Ont.; Grand Secretary-Treasurer—Capt. H. O. Jackson, 376 Huron St., Toronto.

GRAND COUNCIL, N.A.M.E. GRAND OFFICERS.

James T. McKee, 268 Douglas Avenue, St. John, N.B., Grand President.
Thos. Theriault, Levis, P.Q., Grand Vice-President.
Neil J. Morrison, P.O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
Jno. A. Murphy, Midland, Ont., Grand Conductor.
George Bourret, Sorel, P.Q., Grand Doorkeeper.
Richard McLaren, Owen Sound, Ont.
L. B. Cronk, Windsor, Ont.
Grand Auditors.

Mr. G. E. Fair, manager of the Farrar Transportation Co., has returned from Fort William and Port Arthur. He found much activity in shipping and foresees a busy month yet ahead of lake steamers. The Collingwood and Meaford of his line will probably make three more trips each this fall.

Mr. Peter J. Hume, a well known structural engineer associated with Mr. Michael Connolly, Montreal, died recently at St. John, N.B. The deceased was born in Erie, Pa., being educated at Pennsylvania University and Polytechnic, and during his business career, supervised the construction of docks at Levis, Quebec, Kingston and Esquimalt, B.C.

Captain Lindgren, the well known British Columbia mariner, is taking the Canadian Government steamer Estevan from the Atlantic to the Pacific Coast. Captain Lindgren has made many trips through the Straits of Magellan, and knows its rugged coastlines thoroughly. The last steamer he brought out was the Princess Sophia, of the C.P.R. and previous to the Skagway steamer he piloted the Princess Alice and Princess Adelaide out to Victoria from the Old Country. He has also brought out several other steamers now operating in the coast trade.

..**Capt. Michael Ironside**, who was widely known on the lakes and especially well among the mariners of Collingwood, died recently in the Marine Hospital, Goderich, from blood-poisoning. During the past summer he had been master of the steamer Montreal of the Jaques Line, which he had laid up at Montreal; afterwards acting as mate on the steamer Wexford with Capt. George Playser. When mooring at the Soo, on that vessel's last trip, his leg got caught in one of the winch cables. About one week after the accident, he was taken to the hospital, where it was found blood-poisoning had resulted ,from which he succumbed.

Directory of Subordinate Councils for 1912.

Name	No.	President.	Address.	Secretary.	Address.
[illegible]	1	A. J. Fisher,	490 Concord Ave.	E. A. Prince,	61 Elm Grove, Toronto.
St. John,	2	J. F. Matthews,	50 Douglas Ave.,	G. T. G. Blewett,	65 Harrison St., St. John, N.B.
[illegible]	3	Andrew Kerr,	Box 343, Collingwood,	Robert McQuade,	P.O. Box 97, Collingwood,
[illegible]	4	A. E. Kennedy,	395 Johnston Street,	James Gillie,	101 Clergy St., Kingston, Ont.
[illegible]	5	A. F. Hamelin,	3208 Le Tang Street,	O. L. Marchand,	St. Vincent de Paul, P.Q.
[illegible]	6	Alex McNivern,	P. O. Box 234,	Peter Gordon,	808 Blanchard St., Victoria, B.C.
[illegible]	7	A. S. DeGruchy,	Room 23, Williams Bldg.,	E. Read,	859 Thurlow St.
[illegible]	8	Helaire Mercier,	Bienville, Levis,	Jules Lecours,	Bienville, Levis, P.Q.
[illegible]	9	Geo. Bourret,	Sorel, P.Q..	Al. Charbonneau,	P.O. Box 132, Sorel, P.Q.
[illegible]	10	H. W. Fletcher,	636 4th Ave. East,	E. J. Riley,	1030 1st Ave., Owen Sound, Ont.
[illegible]	11	Alex. McDonald,	Windsor, Ont.,	Neil Maitland,	221 London St. W., Windsor, Ont.
[illegible]	12	Jos. Silverthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
[illegible]	13	D. J. Murray,	Victoria Rd., Dartmouth,	Chas. E. Pearce,	Portland Street, Dartmouth, N.S.
[illegible]	14	Thos O'Reilly,	Sault Ste Marie,	Geo. S. Biggar,	Sault Ste Marie, Ont.
[illegible]	15	J. K. Sutherland,	Charlottetown, P.E.I.,	Lem Winchester.	302 Fitzroy St., Charlottet'n, P.E.I.

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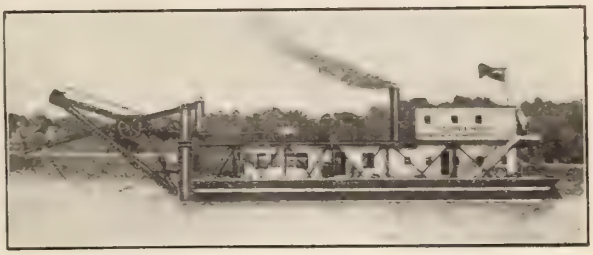
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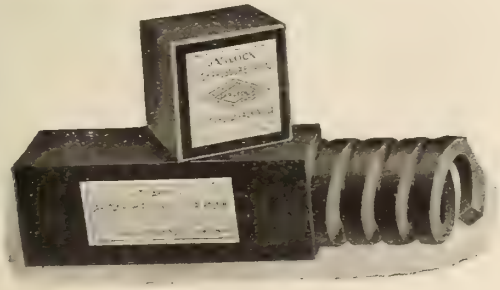
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COMPARATIVE NAVAL STRENGTH OF GREAT BRITAIN.

THE latest figures available as to the relative strength of the navies of the world, presented some few months ago in the British Parliament, shows Great Britain to have 55 battleships, as compared with the combined 64 of the United States and Germany, who rank second and third. This return, it should be noted, does not profess to discriminate between ships of varying battle-worthiness which are nominally of the same type. The vessels are shown in 13 classes and include all battleships and armored cruisers which were not over 20 years of age from date of launch on March 31, 1912, with, in the case of other ships, all those which retained their armaments and were not for sale.

In the tabular statement given below, the number of British battle cruisers building includes the "Australia" and "New Zealand," provided by the governments of these colonies; the first-class cruiser total includes the "Niobe" of the Royal Canadian Navy, and the second-class protected cruiser, the "Benbow," another Canadian cruiser. Of the list of second-hand protected cruisers building, the "Sydney," "Melbourne," and "Brisbane" for the Royal Australian Navy are included; and similarly, Dominion destroyers and submarines are included in the totals for those classes. The following is a summary of the figures given in the return. The letters at the head of each column have the following signification: E, Great Britain; F, France; R, Russia; G, Germany; I, Italy; A, Austria-Hungary; U, United States and J, Japan.

	E.	F.	R.	G.	I.	A.	U.	J.
Ships Already Built.								
[illegible]	55	21	9	33	8	12	31	16
Armored coast defence vessels	..	6	1	..	..	..	9	..
[illegible]	4	..	..	2	..	..	..	..
[illegible]	34	21	6	9	10	3	14	13
[illegible]	18	5	7	..	..	..	3	2
Protected cruisers, II.	38	4	1	26	2	3	15	12
Protected cruisers, III.	16	6	2	11	11	3	..	5
[illegible]	5	..	..	6	..	3	3	4
Scouts	8	..	..	..	..	..	3	..
[illegible]	20	2	3	..	3	11	2	3
[illegible]	179	68	95	109	22	12	40	57
[illegible]	109	104	29	80	84	60	25	57
[illegible]	65	58	29	13	10	6	20	12
Ships Building.								
	E.	F.	R.	G.	I.	A.	U.	J.
[illegible]	10	7	7	9	6	4	6	2
[illegible]	6	..	..	4	..	..	..	4
[illegible] II	9	..	..	8	..	3	..	2
Unprotected cruisers	2	..	..	..	..	..	..	..
[illegible]	..	..	..	..	3	..	..	..
[illegible]	4	..	..	..	..	..	..	..
[illegible]	30	16	10	24	10	6	14	2
[illegible]	..	..	..	..	25	..	..	..
[illegible]	11	25	7	132	10	1	19	9

Relative Totals of Other Powers.

As compared with the relative totals in the return issued in May, 1911, Great Britain has made a net gain of two in her battleship strength; Germany a net gain of one, and the United States a net gain of two. Whereas, therefore, we had 53 battleships to the 61 of the two next strongest Powers, we now have 55 to their 64. On the other hand, the number of ships building for each of the three Powers remains precisely the same. As compared with the Triple Alliance, the British superiority is two ships, as compared with one ship a year ago, but the building list shows that the three Powers have one more ship in hand than was the case then.

There is an improvement to be noted in the position of France relative to Austria-Hungary and Italy, for she has now 21 battleships to their 20, the figures 12 months ago being 17 and 20 respectively. In submarines, Britain maintains her lead over all Powers, but the German total has increased from eight to thirteen. There are also thirteen German submarines building, and it is added that further numbers are uncertain.

OLD SEA CLOCK.

TO ascertain the time when at sea is now a matter of the utmost simplicity, and both passengers and crew can learn the hour of the day at a glance. Such was not the case in the old sailing days, and in order to acquire even the vaguest idea of longitude and time, the seamen had recourse to curious devices. Crude as these devices appear compared with present-day instruments, they saved the mariner from chaos and destruction, and even if he could not name the hour with any degree of certainty he at least knew the day of the week; a circumstance which must have been no small comfort when on the high seas.

The most popular form of old sea clock was the sandglass, which greatly resembled the present-day egg boiler. Many of these glasses were timed to run 24 hours and prior to the ship leaving land the glass was set exactly at noon. If it were carefully watched and turned as soon as the sand ran down the skipper could reckon the days with fair accuracy. Side by side with the large glass were placed half hour and minute glasses.

The man at the helm carefully watched this old sea clock, and announced the time at regular intervals by striking a bell. It was customary to estimate the duration of any incident by so many glasses. "To fog the glass" was an operation very congenial to lazy seamen. It consisted in turning the glass before all the sand had run down, so that the watch was appreciably shortened.

Determining Longitude.

When the 24-hour glass was employed, a little juggling was indulged in for the purpose of finding the longitude. The difference between the 24-hour glass and the time by the sun was estimated, and this difference was held to represent the longitude east or west, according as the sun's time might be before or after the time returned by the glass.

"Taking the sun," was a weird and wonderful operation. Clumsy quadrants were utilized, and toward mid-day the captain appeared on deck to perform his solemn duty. After much screwing of eyes and waggling of the quadrant the captain would bawl out to the mate in omniscient tone, "Make it—bells," the number varying according to personal idiosyncrasies.

Advent of Chronometers.

A demand for a more satisfactory device for estimating time at sea was responsible for experiments being made with pendulum clocks of very rude design, though with little success, and the interest of inventors was aroused when the English government in 1714 offered the sum of $50,000 to anyone inventing a method of reckoning longitude to within 60 miles; $75,000 if within 40 miles, and $100,000 if within 30 miles.

John Harrison, an obscure Yorkshire carpenter, who had achieved a local reputation by repairing and cleaning clocks, came forward with a chronometer, which at once attracted attention. Through the influence of Dr. Halley he was enabled to make a voyage in a government vessel to Lisbon, where he succeeded in determining the longitude to within 1 degree, 30 minutes. For this achievement he was granted a sum of $2,500, to enable him to proceed with his invention, and after 30 years' hard toil he produced a chronometer on which the present marine chronometer is based.

Eclipse of the moon and the position of the stars afforded a little guide to the skipper, who was nevertheless handicapped by his lack of astronomical knowledge and the interior quality of his spyglass. Moreover, eclipses could not be arranged for every night in the week, and there were dark nights when the stars could not be seen. Various devices had, therefore, to be pressed into service.

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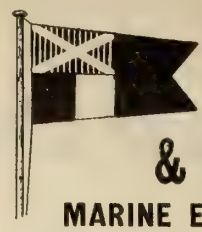
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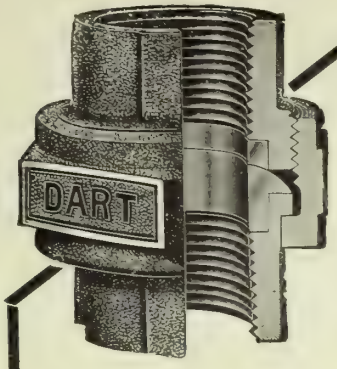
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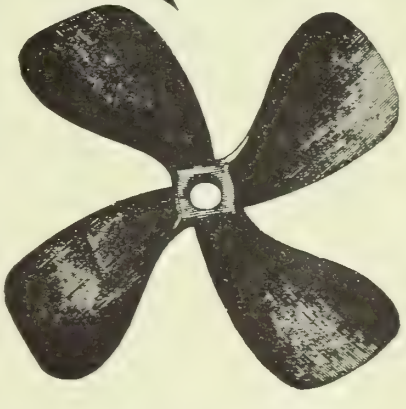
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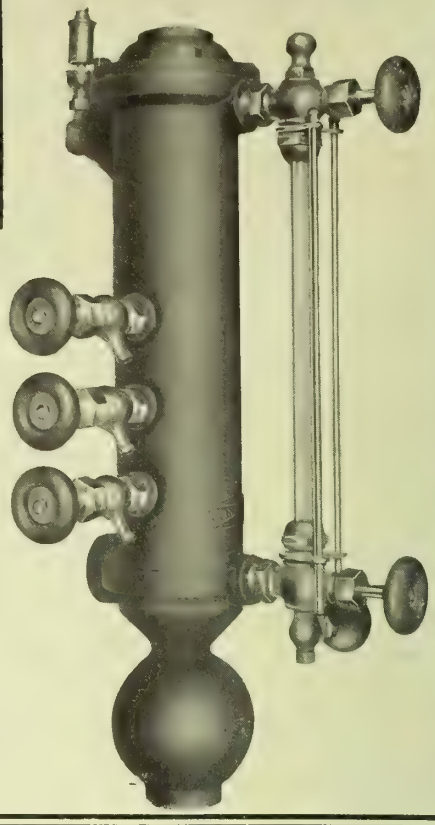


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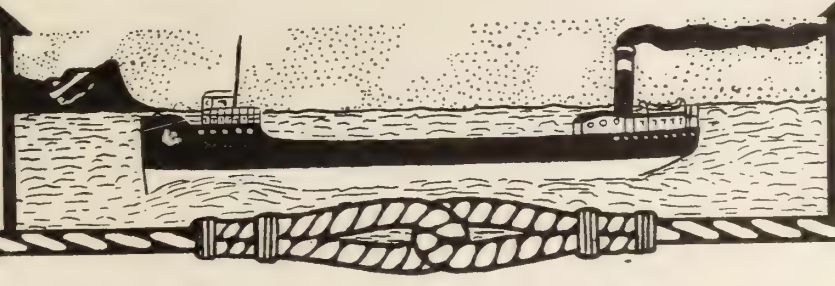
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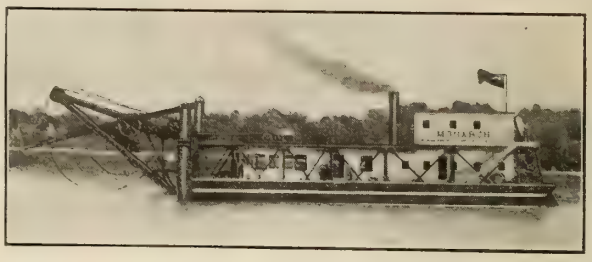
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NEW GRAIN ELEVATOR FOR THE MONTREAL HARBOR COMMISSION.

THE marine traffic of the port of Montreal is second only to that of New York among all the ocean ports of North America. An important portion of the export traffic from Montreal is grain, which is, for the greater part, wheat from the Western Provinces of Canada.

Equipment prior to 1910.

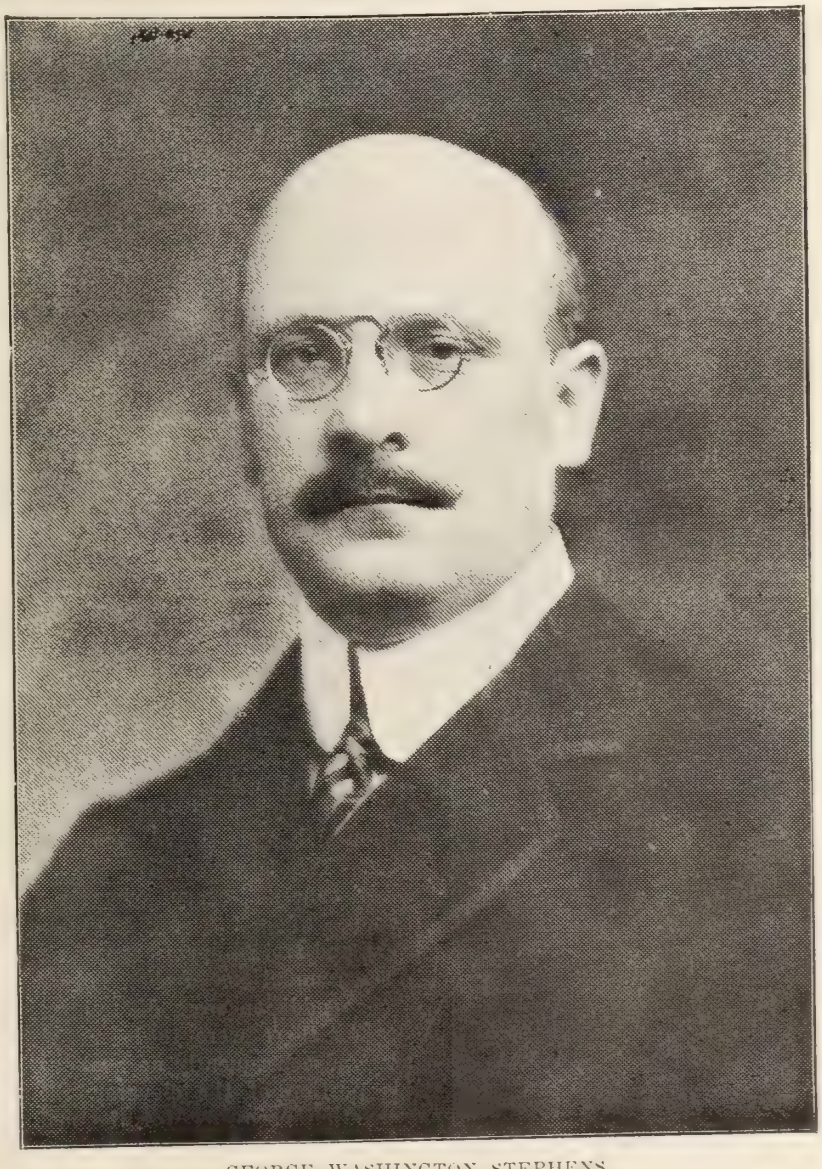
Prior to 1910 the export grain handling equipment in Montreal Harbor consisted of a 1,000,000-bushel steel elevator, owned and operated by the Harbor Commissioners, and adapted for unloading lake and canal vessels, but not designed for extensive railway car traffic; a 1,000,000-bushel steel elevator, owned and operated by the Montreal Warehousing Co. (a corporation subsidiary to the Grand Trunk Railway), equipped for the unloading of both railroad cars and inland vessels; two obsolete wooden elevators, owned by the Canadian Pacific Railway, and since torn down; and a small fleet of floating transfer elevators of varying age and efficiency.

The New Elevator and Its Purpose.

In the early part of 1910, the Harbor Commissioners determined on the immediate construction of a new grain elevator of the highest class to provide (a)—a rapid and efficient plant for the unloading of those railway cars for which the Grand Trunk elevator was not available; (b)—extensive additional capacity for quick unloading of inland vessels, which were often delayed for days in the harbor waiting to be unloaded; (c)—sufficient additional storage capacity so that merchants could hold grain at the exporting point when it became advantageous to do so, and to eliminate the necessity for direct, and almost direct transfer of inland cargoes to ocean vessels; (d)—facilities for shipping grain from the new elevator not only to the present vessel berths but to others being planned.

The Harbor Commissioners retained John S. Metcalf Co., Ltd., as their constructing engineers for the new elevator, and being the designers and builders of the Grand Trunk elevator in Montreal Harbor, and of the great export grain conveyor system belonging to the Commissioners, they were familiar with the development of the port and the details of the problems to be solved. The instructions were to provide the best in structure, equipment and efficiency, because the Commissioners were resolved that Montreal's export traffic in grain should not suffer through lack of thorough facilities. In the summer of 1912 the elevator and a portion of the shipping conveyors were ready for the handling of car grain; and the marine unloading equipment went into operation during October.

Even though the capacity of the new elevator was to be 1,772,000 bushels, it was found in 1911 that the storage room of the port would still be inadequate; and as the elevator was to have ma-



GEORGE WASHINGTON STEPHENS.
(Late Chairman Montreal Harbor Commission.

...inery equipment suitable for taking care of several millions of bushels of storage capacity, the Commissioners ordered the capacity to be increased by 850,000 bushels, making the total capacity of the new work 2,622,000 bushels. The storage addition was ready for grain this fall. A description of the important features of the work follows, the general dimensions, including the storage addition, being 456 ft. 8 in. long by 100 ft. wide and 220 ft. high to the tops of the leg towers.

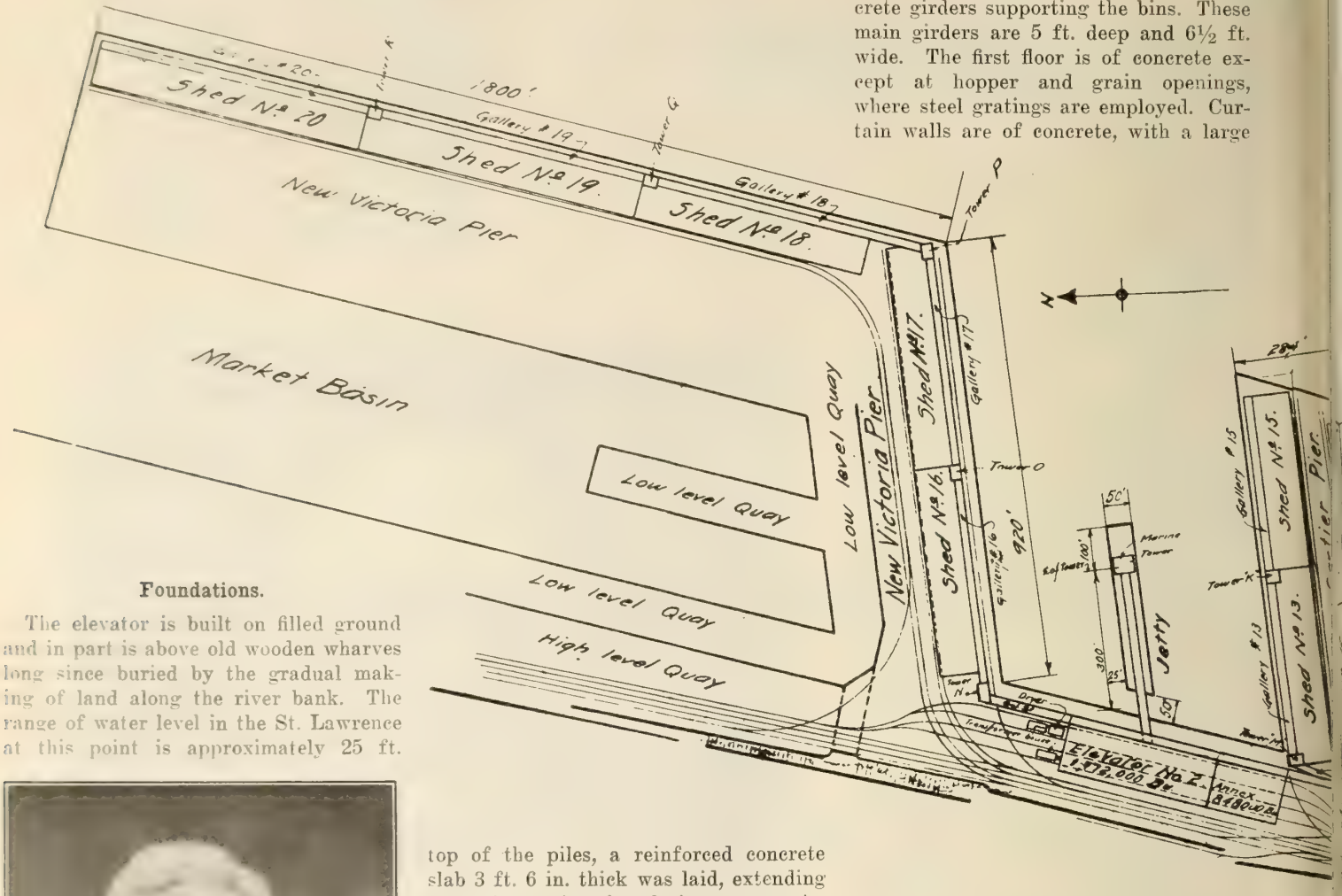
Foundations.

The elevator is built on filled ground and in part is above old wooden wharves long since buried by the gradual making of land along the river bank. The range of water level in the St. Lawrence at this point is approximately 25 ft. The rail elevation is at high water level, but to provide for deep receiving pits it was necessary to carry a considerable portion of the excavation for the main elevator down to a depth of about 20 ft.; accordingly the entire area of the main building was excavated to low water level and 7,730 wooden piles were driven. The driving was found to be exceedingly difficult owing to the boulders, old cribs, etc., beneath the site. Two large drivers with No. 1 Warrington steam hammers were employed. On top of the piles, a reinforced concrete slab 3 ft. 6 in. thick was laid, extending over the entire foundation area. An idea of the foundation problem may be gained when it is known that loads as high as 1,270 tons had to be carried on some of the columns. Concrete piers and walls were built on top of the foundation slab and carried up to the track level. The track girders are of reinforced concrete, except over the receiving pits, where they are of steel. Boot tanks and track hoppers are of steel.

The foundations of the 850,000-bushel storage addition were differently treated. As there were to be no elevator legs, and consequently no boot tanks, in this portion of the elevator, the deep excavation necessary for the main elevator was not required. Consequently, 1,535 reinforced concrete piles were used. These were of the Simplex moulded inserted type, with their tops about four feet below base of rail. Above them the foundation concrete was placed.

First Storey.

Four railroad tracks extend through the entire elevator. The bin openings are 22 ft. 6 in. above the tracks. The columns supporting the bins are of reinforced concrete, about 24 ft. centres, in general, each way. Some of these columns are as large as 6½ ft. by 5½ ft. They are surmounted by the heavy concrete girders supporting the bins. These main girders are 5 ft. deep and 6½ ft. wide. The first floor is of concrete except at hopper and grain openings, where steel gratings are employed. Curtain walls are of concrete, with a large area of fireproof windows. The track openings are closed by rolling steel doors.



Shipping Conveyor Gallery System
12512 ft of Galleries = 2⅜ miles
55953 ft of belt = 10½ "
207 dock spouts
58 Trippers

Capacity and Construction of Bins.

The bins, of reinforced concrete, are rectangular in form, and 86 ft. deep. Bin walls are in general 8 in. thick. Bin capacities range from 6,800 bushels to 14,300 bushels, and the total number, exclusive of shipping bins, is 278. Along the water side of the elevator, the upper



F. W. GOWIE, B.A.Sc. (McGill),
Chief Engineer, Montreal Harbour Commission.

portion of each bin is used as a shipping bin. An intermediate concrete bin bottom is placed about mid height of the latter, the upper portion discharging to the shipping conveyors, and the lower portion being used as an ordinary storage bin.

The bins were constructed by the use of moving forms, which were raised by nuts working in jack castings attached to them, the nuts travelling on threaded rods set vertically in the concrete walls. Rapid progress was made in the building of the walls, the height of 86 ft. in the storage addition being run in less than fourteen days, day and night work. The bin bottoms are of reinforced concrete, in part supported directly on the bin girders and in part suspended from them. Each bin opening is provided with a cast iron and steel revolving turnhead, with rack and pinion valve opened and closed from the floor below.



L. E. GEOFFRION,
Late Member Montreal Harbor Commission.

Cupola.

The cupola construction is a remarkably fine example of reinforced concrete. Columns, girders, floor and roof beams, wind bracing, stairs, curtain walls, floors and roofs are all of concrete. In fact, only in the case of machinery supports has structural steel played any important part. The lower sides of floor and roof beams are cambered. Curtain walls are 2½ in. thick, supported at short intervals by concrete ribs connecting to the floor beams. Windows are of fireproof type. Roof covering is of tar, felt and gravel, except on the leg towers, where the concrete is waterproofed and covering omitted.

The cupola is 107 ft. high above the bin walls and 220 ft. above the base of rail. This means that there are very few, if any, higher reinforced concrete buildings in existence. Above the storage addition, the cupola is but two stories high, as the only machinery above those bins is the conveyors and spouts for filling the bins.

Marine Tower.

A marine tower for unloading boats is placed on a jetty projecting into the neighboring slip. The tower is so placed in order that two vessels may be unloaded simultaneously, one lying along each side of the jetty. The tower is 340 ft. from the elevator. It is built of structural steel, this material being adopted instead of concrete because it is expected that, in the event of the Georgian Bay Canal being built and 600-ft. vessels being brought to Montreal for unloading, it may be desired to extend the jetty farther and move the tower to



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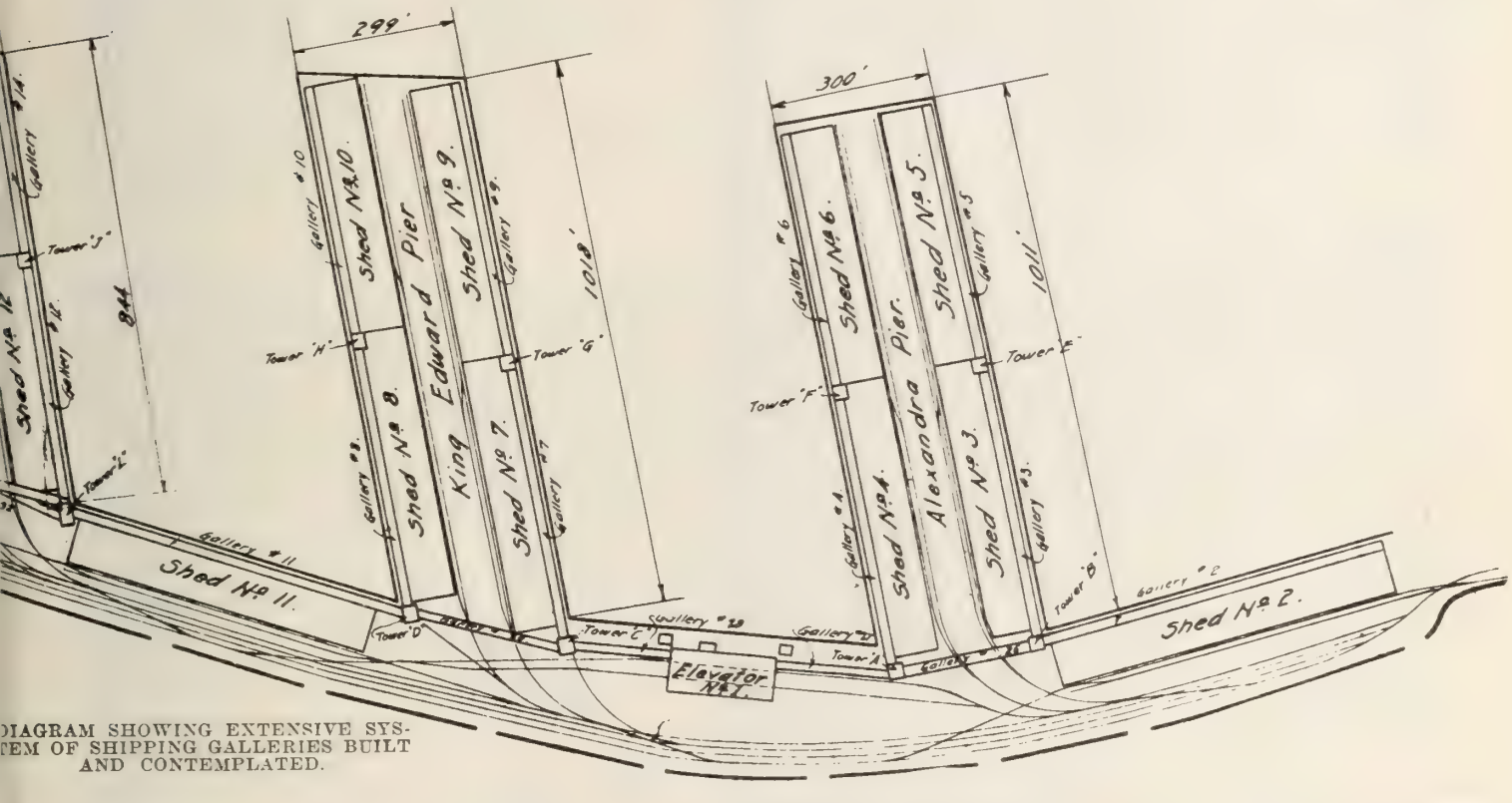
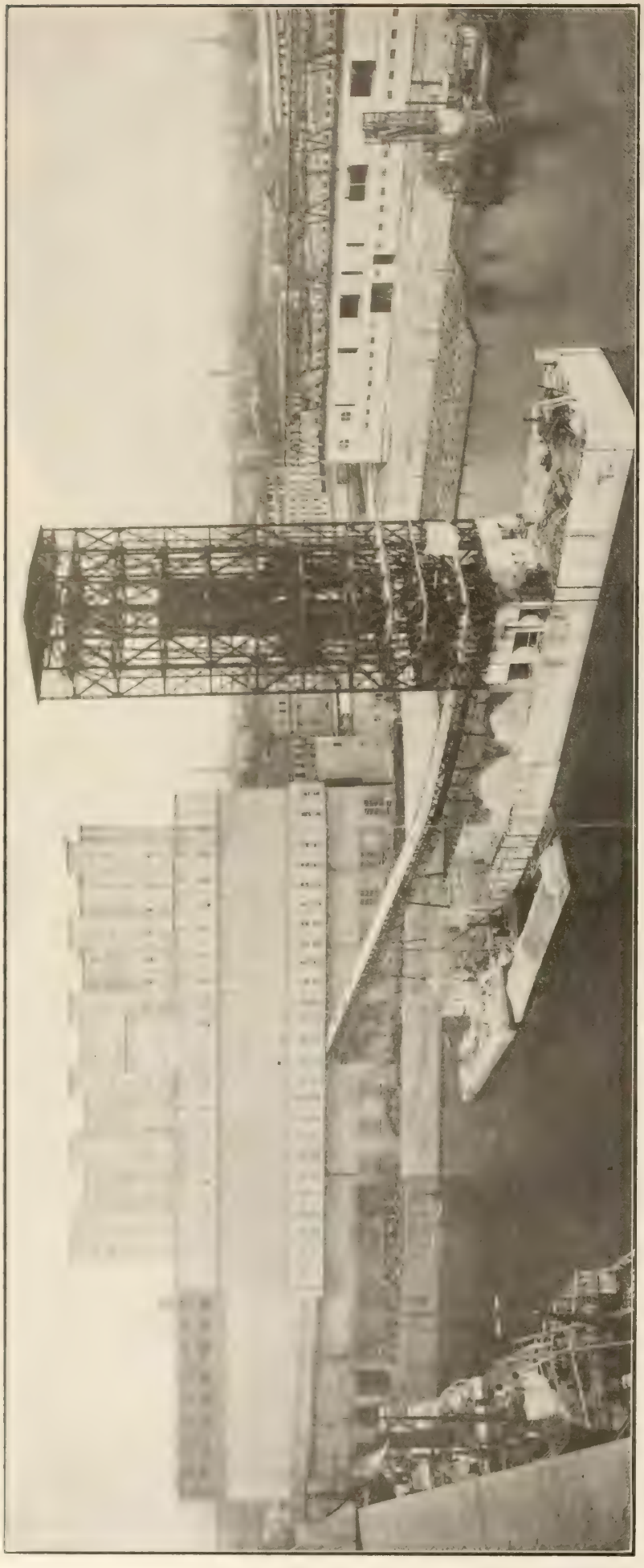


DIAGRAM SHOWING EXTENSIVE SYSTEM OF SHIPPING GALLERIES BUILT AND CONTEMPLATED.



NEW GRAIN ELEVATOR FOR THE MONTREAL HARBOR COMMISSION. VIEW FROM JACQUES CARTIER PIER.

such a distance from shore that 600-ft. vessels may be unloaded without interference. As the shorter jetty is, however, better adapted to present congestion in the harbor, it has been adopted until such time as the increased size of lake boats coming to Montreal shall require its extension. A steel gallery runs from the marine tower to the elevator, and contains the conveyor belts for taking grain received by boat to the elevator.

Shipping Conveyor Galleries.

Study of the accompanying diagram will show the extensive system of shipping galleries built and contemplated. Those already built in connection with elevator No. 1 were two miles in extent. Those to be added in connection with elevator No. 2 will bring the total to 2½ miles, using 10 miles of rubber belt. All galleries are of steel with concrete floors and roofs and corrugated steel side-covering.

Miscellaneous Structures.

A reinforced concrete building is provided for a grain dryer and its boiler plant, and a similar structure for the transformers and switchboard.

Receiving Equipment from Cars.

There are 4 receiving tracks, 24 track hoppers and 12 receiving legs. Each leg is fed from two hoppers, one on either side, interlocking being used so that it is impossible for grain to reach the leg from more than one hopper at a time. Track hoppers are of large size, and a pair of power shovels is provided at each. Thus, the unloading of a car on one side of the leg is independent of that on the opposite side, and unloading from both cars may proceed simultaneously, as the legs are of sufficient capacity (12,000 bushels per hour each) to quickly elevate the contents of either hopper as soon as the elevation of the contents of the other has been completed.

The elevator will receive 240 cars in ten hours with the ordinary complement of men, and with extra men can better this in emergencies. Cars are handled by heavy carpullers using ¾-in. wire cable. Each receiving elevator discharges to a 2,500-bushel garner over a 120,000-lb. Fairbanks hopper scale, whence the carload is sent by spouts, or belt conveyors and spouts, to the desired bin.

Receiving Equipment from Boats.

The marine tower is equipped with two marine legs, each of 20,000 bushels hourly capacity on the dip. One leg operates on each side of the tower, so that two boats may be unloaded simultaneously. The grain from the legs is

weighed by two pairs of 6,000-lb. Fairbanks continuous automatic weighing machines. Complete ship shovel and clean up shovel apparatus, operated by air, and the best of equipment for raising and lowering the legs, and adjusting them horizontally to the position of the boots, is provided. The marine legs are of steel, 115 ft. long between centres of pulleys, and are the longest marine legs ever constructed.

Two 40-in. belt conveyors carry the

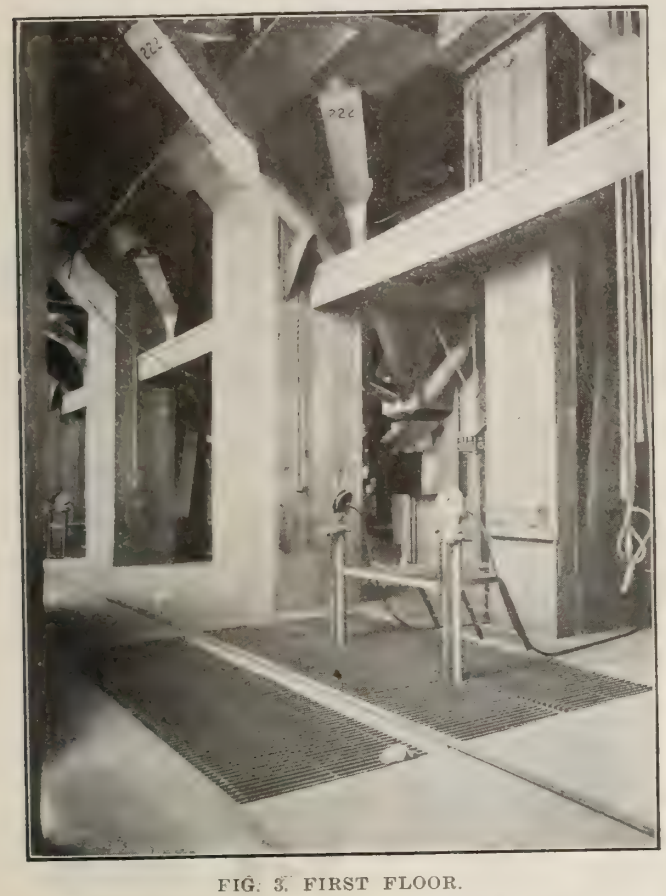


FIG. 3. FIRST FLOOR.

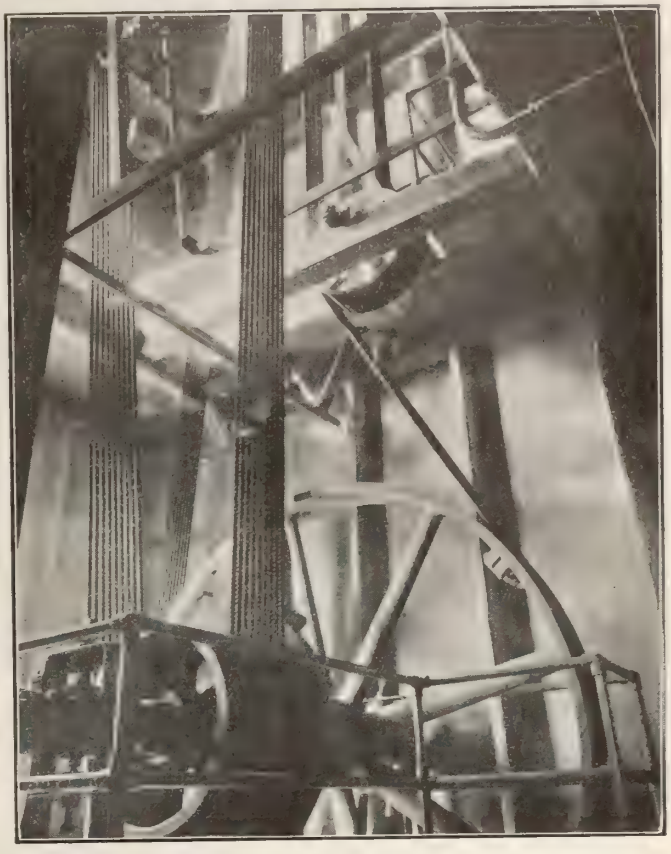


FIG. 9. DRIVE TO RECEIVING ELEVATOR LEG.



FIG. 4. DISTRIBUTING SPOUTS. STOREY OVER BINS.



FIG. 11. MAIN SWITCHBOARD.

grain to the elevator, where two lofter legs elevate it to the cupola. There, a system of 40-in. belt conveyors distributes it to the double jointed spouts leading to the bins. The maximum hourly capacity for receiving from boats is 40,000 bushels.



FIG. 5. BELT CONVEYORS IN SECOND STOREY OVER BINS.

Distributing.

Two reversible longitudinal conveyors in the cupola receive from the scales and distribute grain longitudinally.

Cleaning.

While Montreal is not a cleaning point, two large steel cleaning machines are provided for emergency cleaning and separating.

Shipping to Cars.

Four car-loading spouts are provided so that cars may be loaded if desired. This sometimes becomes necessary in order to get grain to a winter port farther east after the port of Montreal has closed.

Shipping to Ocean Vessels.

In connection with elevator No. 1, the shipping conveyors serve 14 vessel berths on King Edward, Alexandra and Jacques Cartier piers and the neighboring shore wharves. Five berths are being added on the new Victoria pier. The side shipping gallery of elevator No. 2 contains six shipping conveyors. Two will extend north to serve the Victoria pier, and four will run south to connect with the conveyors to the present 14 berths. It will be possible for either elevator to ship to any of the 19 berths. The shipping system of elevator No. 2 will be served by five shipping legs each with a capacity of 16,000 bushels per hour. The total shipping capacity of elevator No. 2, starting with the shipping bins full, will be 90,000 bushels hourly for ten hours.

Grain for shipment by boat is weighed through five pairs of 5,000-lb. Fairbanks automatic weighing machines, each provided with automatic registers, printing devices and electrical counters in the weighman's office. As shipping to boats and receiving from boats are continuous operations, automatic scales are used for this work, but as it is necessary in receiving from cars to keep each car weight separate, hopper scales are employed for car receipts.

Drying.

A Hess drying plant with a capacity of 5,000 bushels per day is included in the equipment. This has a separate leg so that interference with the main receiving and shipping legs is avoided.

Power.

All power is supplied by electric motors of the induction type. In the elevator, marine tower and the new shipping galleries, the motors number 80, and total 4,680 h.p. An ingenious and efficient system of electric signals controls the operation of elevator legs and shipping conveyors. When the extent of the shipping system is remembered, and the interconnection of the two elevators, it will be seen that the signal system, particularly for shipping, must be instantaneous and sure. Its design was accomplished with credit.



FIG. 2. FIRST FLOOR.

General.

The Harbor Commissioners' grain storage and shipping system will now consist of:—

Two grain elevators with two marine legs each, and a conveyor system by which grain can be delivered from either elevator to any of 19 steamer berths. Everything is of fireproof construction and all machinery is electrically-driven. There is a storage capacity of 3,620,000 bushels and contemplated



FIG. 6. BELT CONVEYORS IN SECOND STOREY OVER BINS.



FIG. 7. 2,000 BUSHEL HOPPER SCALE.



FIG. 8. AUTOMATIC WEIGHING MACHINE. 5,000 LBS. PER DRAFT.

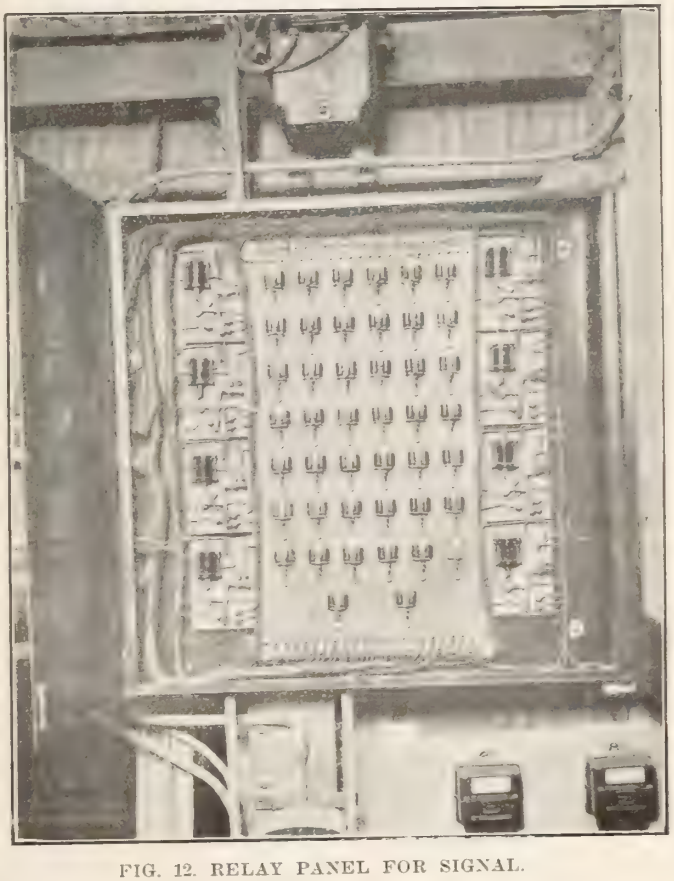


FIG. 12. RELAY PANEL FOR SIGNAL.

extensions for 3,790,000 bushels more; total 7,410,000. Grain may be received from cars at a rate of 33,000 bushels per hour, and at the same time from boats at a rate of 55,000 bushels per hour.

Grain can be shipped by conveyor system to ocean steamers at their regular berths at a rate of 150,000 bushels per hour, equal to 4,500 tons per hour. It is possible to deliver grain to five steamers at the same time at a rate of 30,000 bushels per hour each, or it is possible to deliver to 10 steamers 15,000 bushels per hour each, at the same time. The present conveyor system comprises two miles of conveyor galleries and over eight miles of rubber belting; in addition to this there is under construction another half mile of gallery with two miles of rubber belting.

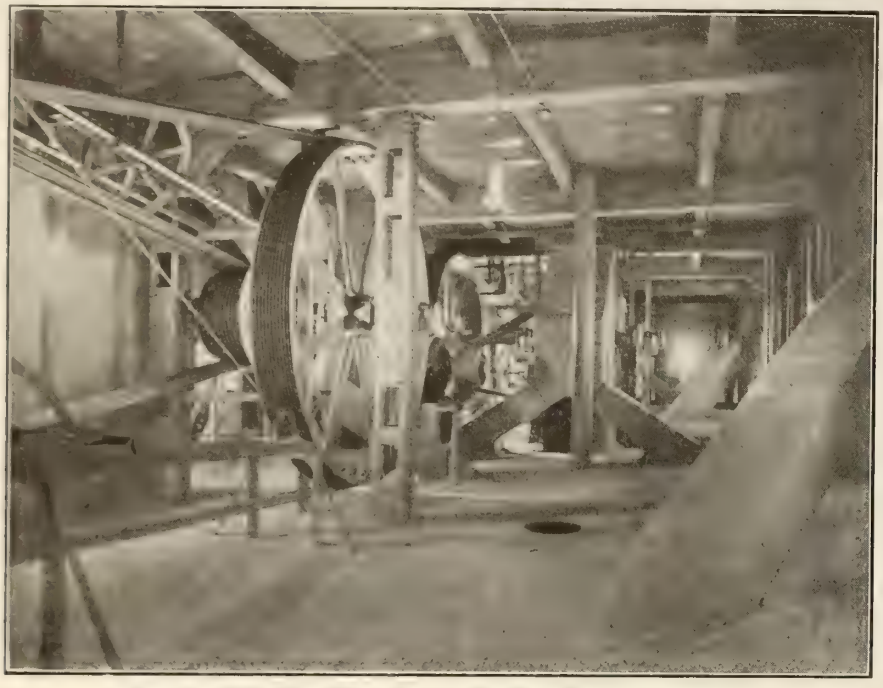


FIG. 10. TOP FLOOR. ELEVATOR HEADS AND DRIVES.

The constructing engineers for the Montreal Harbor Commissioners were the John S. Metcalf Co., Ltd., Montreal, under Mr. F. W. Cowie, chief engineer. This company were also the designers of the conveyor system in connection with elevator No. 1. It is easy to say that this building or that building is the best ever built, and that this elevator or that elevator can handle more grain than any other; the Harbor Commissioners responsible for the new work, Messrs. Stephens, Ballantyne and Geoffrion, with Mr. David Seath, secretary, are content to let the elevator and accessories speak for themselves.

POWER FOR MARINE TRANSPORTATION.

AT a meeting of the Society of Engineers (Incorporated), held on Nov. 4, Mr. Wm. P. Durntnall read a paper on "The Generation and Electrical Transmission of Power to Marine Transportation." The author pointed out that the fundamental problem of propulsion was to produce economically a thrust sufficient to overcome the resistance which a ship meets in moving through the water. It was stated that the earliest attempt at applying mechanical power to propulsion was made by Blasco de Garay, a Spanish navigator, in 1543, and that the screw propeller was introduced about 1835 by Francis P. Smith, a farmer, of Hendon; the Great Britain being the first screw-driven boat to cross the Atlantic. Reference was made to the hot-air propelled ship Ericsson, designed by the famous inventor of that name, and to the method of propulsion by jets of water. A description was also given of the propelling machinery of the Great Eastern.

The author suggested that the "thermal propulsive efficiency," i.e., the percentage of fuel heat converted into effective thrust at propeller, should be the measure of the commercial value of a ship, especially in the mercantile marine, and he showed that the intermediate losses were often very great. The conditions of speed for effective propulsion by screw propellers were discussed, and the practical requirements which should be met by the prime mover, especially with regard to speed control, were laid down.

The advantages and disadvantages of the steam turbine for marine propulsion were enlarged upon, and it was shown that the latter were by no means inconsiderable, and that, therefore, the steam turbine driven vessel was not the last word in efficiency, although in many respects the turbine possessed advantages over the reciprocating engine. An account was given of the author's investigation of the problem of devising some system of propulsion in which the defects of the steam turbine would be wanting, and the resulting introduction of the method of electrical propulsion known as the "Paragon" system, which is now being installed on the collier Jupiter of the United States Navy. This vessel, of 20,000 tons displacement and about 6,000 h.p., was the first high-power electrically propelled ship ever built, and when her trials are completed, an instructive comparison will be possible with her sister ship, the Cyclops, in which the propellers are driven by steam engines.

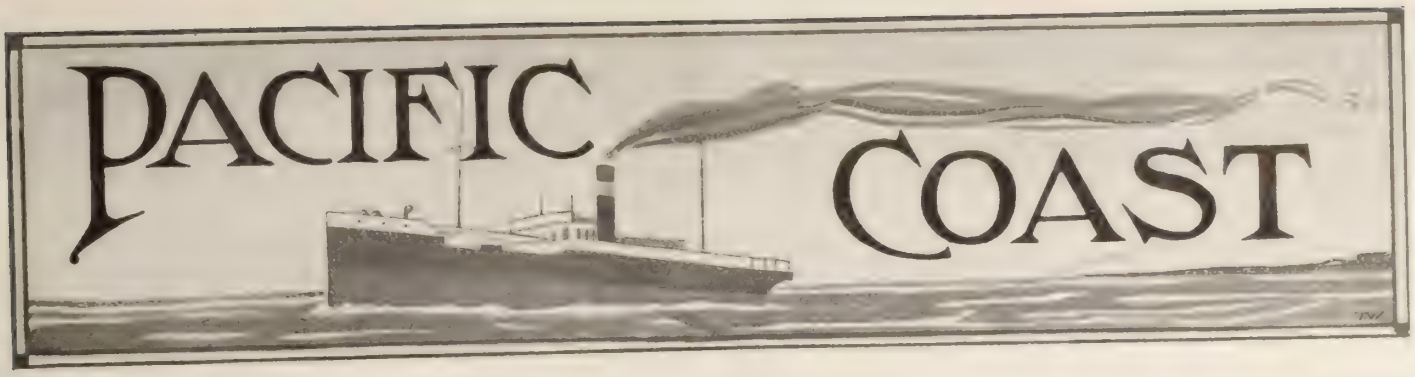
The "Paragon" system of electrical propulsion was described in detail, and it was shown that this method met all the requirements which had been laid down as necessary for an efficient motive force for driving ships' propellers. It was pointed out that the electrically driven ship had now become a matter of more than academic interest, and that the success which might attend the trials of the Jupiter might even change the naval programme of more than one of the Great Powers. An appendix to the paper gave illustrations and descriptions of the system designed and advocated by the author.

THE AUTUMN TRAGEDIES OF 1912.

CANADA'S Marine Department should investigate the recent tragedies of Lake St. Louis and the Madawaska river.

A toll of twenty-five lives, or almost one-sixtieth as many as were lost on the Titanic has been taken by the two river boats which went down in the Montreal-Ottawa district during the storms of autumn, 1912. Any sort of boat seems to be considered good enough to carry passengers on rivers and minor lakes of Canada, and the authorities seem to imagine that they need not concern themselves about the equipment or seaworthy qualities of a craft that navigates on water less than a mile and a half deep. The victims of the St. Cecilie wreck on Lake St. Louis and the Mayflower wreck on the Madawaska are just as dead as if they had been drowned in the Atlantic Ocean. The Department of Marine and Fisheries might easily squander more energy upon enquiry into such accidents than seems to have been displayed in the avoidance of these tragedies.—Ex.

If a separate and distinct trade school is found to be feasible and successful, it will require a practical teacher for the trade.



COQUITLAM SHIPBUILDING CO.

THE Coquitlam Shipbuilding Company has made another advance towards completion of their construction yards and mill at south end of Pitt River Road, when a contract for sawmill machinery, amounting to a sum between $22,000 and $25,000, was awarded to the Pacific Machinery Co., Vancouver. The mill, the foundation of which was begun quite recently with the arrival of a pile-driving outfit, will have a capacity of somewhere between 25,000 and 30,000 feet per day, being intended mainly to serve the needs of the shipbuilding plant. The power to drive four electric motors will be obtained from the Western Canada Power Company. Work is being pushed as fast as possible, two large buildings, a business office and a large stable, being already finished. A third and larger building is well under way, the upper portion of which will be used for the moulding machinery, etc., the lower storey serving as a general workshop and store room for tools and implements. When this building is completed, the work of construction will proceed much faster, as under present conditions it is held back by rainy weather. The men now employed are well housed in the Terminal Block on Broad Ave. They are all old Nova Scotia men skilled in the art of shipbuilding. The ancestor of one of them founded the first ship-building yard in western Nova Scotia, in the year 1755. These old yards turned out vessels adapted for the Newfoundland fishery trade, being of a simliiar class to those to be built in Coquitlam.

As already announced, the keel was laid in the latter part of November for the first vessel, a 175 foot, four masted schooner. Although the vessels constructed will be confined at first to the type suited for service in the lumber trade, it is Mr. Shafner's intention later to branch out into other lines of the industry, including the construction of tug-boats, etc.

C.P.R. TERMINAL AT VANCOUVER.

THE development of the Canadian Pacific railway and steamship traffic from and into Vancouver has made necessary the extension of the existing facilities and accommodation at that port, for the efficient and rapid handling of freight, and the comfort and convenience of passengers en route.

The existing passenger station of the C.P.R. at Vancouver, located at the foot of Granville Street, near the shore line of Burrard Inlet, was built about fourteen years ago, and except for minor alterations is unchanged from its original plan. The general waiting room and ticket offices are at the street level, and the baggage room is on the track level, which is about 30 feet below the street. Along the water front, across the local freight yard tracks, are located the steamship wharves. There are two large sheds on a jetty pier of recent construction used by the Trans-Pacific steamship lines; also five sheds adjoining the longitudinal wharves used by the Seattle, Victoria, Alaska and other steamship lines of the Canadian Pacific Railway. Between the wharf sheds and the passenger tracks adjoining the passenger station, certain of the freight tracks serve the several sheds, and other tracks are used for drilling and storage. The yard tracks extend along the harbor front about 1½ miles.

Detail of Improvements.

The general scheme embraces a passenger station and office building suitably located on available land immediately east of the present passenger station. There will be four passenger tracks with provision for more when required, separated by wide platforms, between the station and the present freight yard. The passenger tracks are to be raised about 5 feet above the present track level in order to reduce the difference in level between the street and the tracks to about 25 feet. To avoid an inconvenient grade crossing and delays to traffic between the city and steamship wharf, a bridge, on the line of Granville Street extended, is to pass over the passenger and freight tracks to the steamship pier, and connect directly with passenger accommodations on the pier. An incline is also to be built leading from the west side of this bridge to the wharf, giving access to the lower deck of the pier and freight sheds and the water front. Another viaduct over the tracks is to be built on the line of Burrard Street extended northerly, with an incline giving access to the present Trans-Pacific pier and other portions of the water front.

Railroad Station.

The main entrance of the passenger station will be on Cordova Street, with the main waiting room located centrally in the station on the street level. Ticket offices serving the several classes of railway and steamship passengers are located at one end of the waiting room, and the baggage checking room, lunch and dining room, parcel room, women's waiting room, men's smoking room, news booth, information booth, and other facilities are all placed immediately adjoining the main waiting room.

On the lower floors of the station are located the baggage rooms, express companies' space, immigrant rooms, supply rooms, and other station facilities not directly used by passengers. Stairways and lifts connect the two levels of the station, and also afford communication with the office floors above. A separate footbridge is carried over the passenger tracks directly connected with the waiting room at one end and with stairways leading to the track level, giving access to platforms without crossing tracks at grade. The track platforms are 1,000 feet in length, and are to be covered with shelter sheds of the umbrella type. The platform adjoining the station will be used only for baggage, express and supplies.

Above the public rooms of the station building the space will be devoted to the general offices of the railway company. The interior arrangement of the office space will be adapted for a unit system of subdivision; that is, each panel will have heating and lighting facilities so that partitions may be placed or removed at will in order to provide for changes in arrangement of office accommodations which may be desired from time to time.

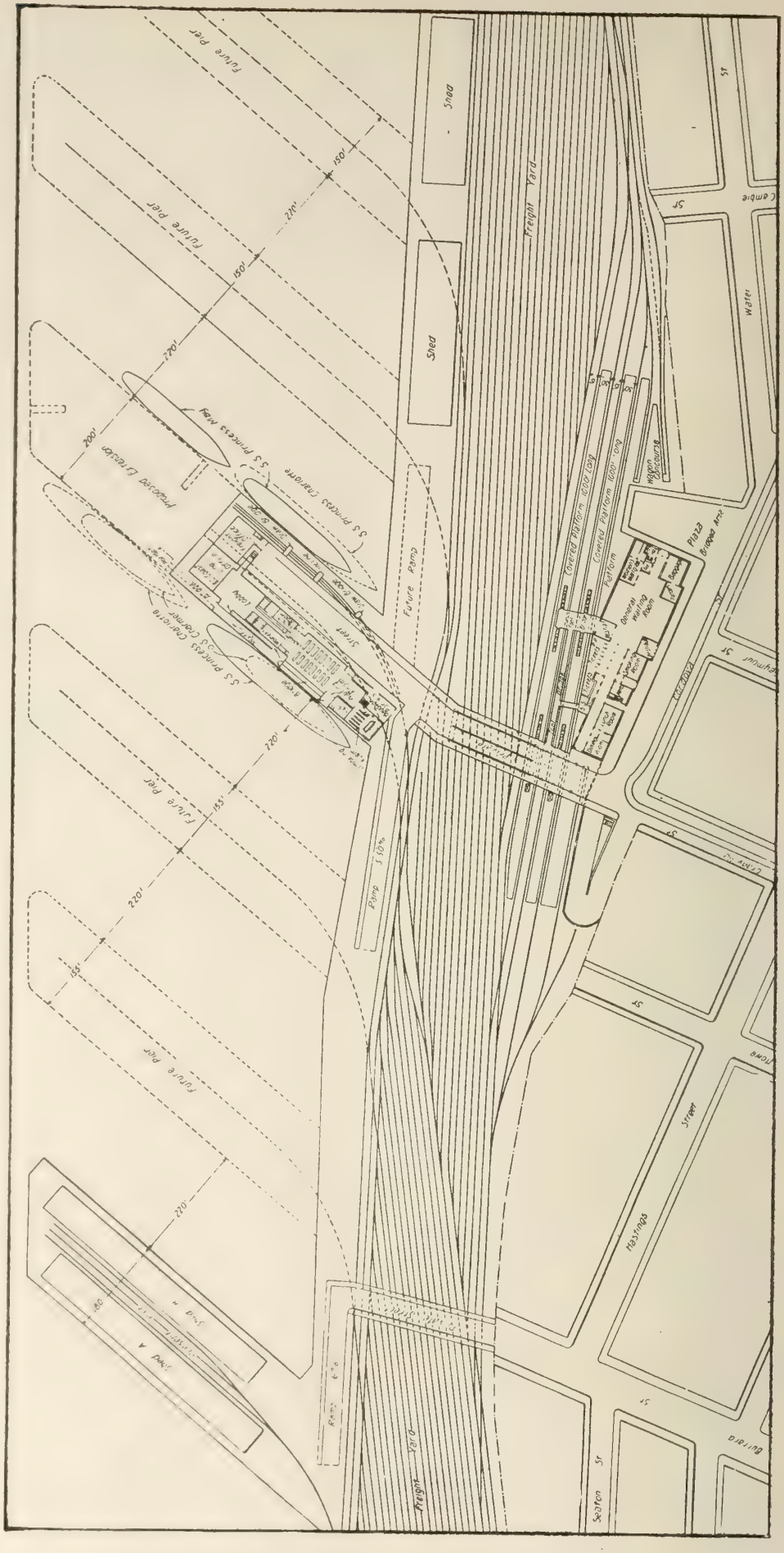
Steamship Station.

The proposed steamship station on the pier is a two-level building, the upper

floor being devoted to the passenger business and offices, and the lower floor to freight, baggage and express. There will be double-level gangways on the west side of the pier, which will be used for the Victoria and Seattle service, the lower gangway being used for freight, and the upper for passengers; these gangways will be supported on floating pontoons to maintain the landing at a constant level with respect to the boats. On the passenger or upper level of the pier are provided waiting rooms, ticket offices, baggage checking room, customs office and other conveniences. Separate rooms are provided for outgoing and incoming passengers. Two tracks will be placed on the surface of the pier within the shed, and one track on the outside of the building for the direct handling of freight between cars and steamers.

The essence of the general design has been to secure easy lines of communication between the railway trains, steamers and the city. The traffic conditions at Vancouver are unusual as compared with other large terminals on account of the absence of suburban business. The aggregate number of trains is not large, but they are long and frequently are run in several sections and contain a number of classes of traffic.

The Westinghouse, Church, Kerr Co., Montreal, who prepared the plans, in conjunction with the C.P.R. officials, are also carrying out the constructional work.



LAYOUT OF THE CANADIAN PACIFIC RAILWAY TERMINAL AT VANCOUVER, B.C.

WIRELESS IN CANADA.

MARCONI'S Wireless Telegraph Co., Ltd., is advised that the contract with the Canadian Government for the operation and maintenance of nine additonal stations on the Great Lakes of Canada has been signed. When these stations are completed, the Canadian Company will receive an additional subsidy from the Dominion Government of $31,500 per annum. The agreement is for a period of nineteen years.

COMPULSORY WIRELESS.

THE Hon. Mr. Hazen, Minister of Marine, secured the first reading of his Government bill to provide for the compulsory installation and inspection of radio-telegraph or wireless telegrahpic apparatus on certain ships, at the sitting of the Commons on December 6. The Minister explained that he proposed to provide for the operation of wireless telegraphy on all vessels carrying fifty or more passengers, and traveling between ports two hundred miles distant, under penalties of fines of $5,000 against the ship and $100 against the master.

FLOATING DOCK "DUKE OF CONNAUGHT."

"SYREN AND SHIPPING" in a recent issue says that "The story of how the great floating dock Duke of Connaught was towed across the Atlantic from Barrow-in-Furness to Montreal, where it recently arrived, adds another page to the romance of sea life. It was on August 31 that the towering structure left Barrow in charge of the Roodezee and Zwartzee, the most powerful tugs in Messrs. L. Smit & Co.'s famous fleet. Capt. Vamrees was in command of the first-named and Capt. Persson had charge of the latter, while on the dock itself, where they remained during the whole of the two months' voyage, were Capt. Verschoor and a crew of fourteen men. Fair weather was encountered as far as the Azores, but thenceforward, almost to the last day of the long journey, those who were responsible for the piloting of the dock experienced a very anxious time owing to the succession of gales that had to be battled with.

"On no fewer than five occasions between Fayal and the mouth of the St. Lawrence, the hawsers had to be cast off. The first time this happened was a week after leaving the Azores, both tugs parting company with their tow about six o'clock in the evening. For over forty-eight hours the dock drifted helplessly in the heavy seas, straying something like sixty miles out of its course before it was secured again. Seven days later, on October 8, the cables were slipped once more during a south-easterly hurricane, but the following day the hawsers were got aboard successfully.

"All went well for five days more, when the severest ordeal of all faced the much-tried crews. The dock was about forty miles from Sydney (C.B.), making slow progress against a violent northerly gale, when the hawsers were again cast off. The dock was driven before the storm at so rapid a pace that the tugs were hard put to keep up with it, and for a whole day they followed it down the coast of Cape Breton Island awaiting a favorable opportunity to make fast. It was an arduous period for all concerned, but in due course the wind veered to a more favorable quarter, enabling the tugs to get to leeward, and, by pouring oil on the water, to make connection. On one occasion an enormous wave caught the Roodezee and nearly carried her on to the Zwartzee, while several times the sea dashed right over the walls of the dock, sixty feet above the water-level. The passage from Fayal to Sydney occupied twenty-nine days.

"To bring the dock up the St. Lawrence was anything but an easy task, for the lofty walls presented so large a surface to the wind that the maintenance of a straight course in the ship channel called for all the skill the tugmasters had at command, while there were also passing steamers to be reckoned with. The successful accomplishment of the undertaking adds another notable towing feat to the long list which Messrs. Smit & Co.'s Sliepdienst have to their credit, and the eulogistic references which it has evoked from Canadian harbor and shipping officials as well as from the Canadian press are richly deserved. It is worth noting, by the way, that both tugs were specially fitted with oil tanks for the voyage, as was the dock itself, the wisdom of this precaution being proved again and again during the trip."

Port Stanley.—The annual report of the Department of Public Works has some very interesting information regarding the harbor at Port Stanley. It shows the amount of money expended, and the improvements in hand. During the past fiscal year, 501 vessels entered this port with a tonnage of 940,542 tons, while 480 vessels departed with a tonnage of 686,225 tons. Repairs to the pier were in progress at the beginning of the fiscal year, and were carried on until April 29 following, when work was suspended. It was again resumed on July 4 last, and was still in progress at the end of the fiscal year. The total expenditure for the fiscal year 1911-12, was $16,229.03, of which $7,633.23 is for dredging.



FLOATING DOCK "DUKE OF CONNAUGHT" IN MONTREAL HARBOR.
The two Dutch tugs which towed it across the Atlantic are seen in the foreground.

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Vol. II DECEMBER, 1912 No. 12

THE SEASON'S GREETINGS.

THE publishers of "Marine Engineering of Canada" extend to its subscribers and advertisers the Season's Greetings, and express the hope that "those who go down to the sea in ships and do business in the Great Waters," may, in the New Year voyage on which they are about to embark, be protected from disaster and calamity relative to their more or less hazardous calling.

THE CANADIAN NAVAL CONTROVERSY.

IT is not our purpose in this brief article to even attempt to discuss the many issues involved in the general questions of Imperial navy contributions or of an out-and-out Canadian navy; rather is it our purpose to draw attention to that feature, affecting to a lesser or greater extent both views, to wit the manning of the ships by a Canadian crew. Most people are agreed that in either case, something more than the vessels' names and their cost should savour of the Land of the Maple.

The difficulty of securing even the nucleus of a crew for one of her Dreadnoughts is a real one, experience with the Niobe and Rainbow, being of itself ample proof. Many, doubtless, are the contributory causes to this state of affairs, and each one of sufficient import to demand attention and adjustment. The particular feature, however, to which our remarks will more directly apply is that of creating a seafaring spirit, and developing a desire or craving for a life either aboard a merchantman or man-o'-warsman, among the rising generation of Canadians. We say "among the rising generation," because unless those of us of more mature years have drank in some measure during our youthful days of the cup of Neptune, there is every prospect of our passing it up now, if presented. "The Sea is Britain's Glory," and, of course, we are aware that to her insular position may be largely ascribed the reason why this should be so; yet, the mastery of the sea, in the sense that the building and navigating of ships is where the real glory of Brittania lies, seems to make apparent the lack of a similar element in our Canadian economy, and shows the reason why we are lacking in the matter of men with whom to commission our ships.

The shipbuilding and marine engineering industries bring to their aid the very cream of the youth of the Old Land ,and instil in the minds of these an intimacy with and fascination for at least a brief seafaring experience. In no country of the world does there exist that interest in matters marine which permeates the individual being, as does that of Great Britain, and while it must be admitted that her lead is hard to follow, still less to reduce to any extent, there must of necessity be brought into more prominence in this Canada of ours, the foundation and groundwork on which to rear the superstructure of men trained and having the desire instilled and cultivated for a life on the ocean wave.

We are of opinion that the more general establishment of shipbuilding and marine engineering plants (mercantile and naval) is the real starting point from which to secure the manning of our ships, and until this be more generally recognized and the requisite encouragement given, there will continue to be lacking the material with which to secure a real Canadian navy, or to make our Imperial contribution a whole-hearted and wholly Canadian participation in the Empire's defence. In addition, the establishment of shipyards means, practically speaking, the era of a new industry, and given the opportunity for its practice, there is no reason why it should not in a few years' time, be placed on a similar plane to that which we hold in the international arena of general manufacturing.

LATE NAVIGATION ON THE GREAT LAKES.

THE desire to extend the season of navigation on the great lakes, however meritorious, as far as intention went, has not, we are afraid, when put into practice, worked out too successfully on this occasion at least. Nature and the elements have, for some considerable time past, behaved in anything but an amiable and respectful manner to our inland shipping and their hardy crews, and it seems as though from the casualty and hardship records, that the risk is a great one and the gain derivable not such as to warrant repetition of the extension period in future. We anticipate that considerable pressure will be brought to bear, in another year, to bring navigation to a definite close at a date less likely to encourage vessels and their crews to fall a prey to the buffeting of the tempest, or the risks and rigors of fog, snow and ice.

THE "ROYAL GEORGE."

IN our last issue reference was made to the stranding of the Royal George in the St. Lawrence, near Quebec, and it is with pleasure that we have to record the success which has crowned the efforts to get the vessel afloat again, enabling her to proceed meantime to Halifax, N.S., with a view to carrying out the work of making her once more seaworthy.

The decision of the Court of Inquiry into her stranding was a rather important pronouncement, and created, we are afraid, a rather bad impression, so far as that part of it is concerned, which deals with the certificates of the ship's officers.

Marine News From Every Source

Prince Rupert.—It will take ten years to complete the improvements to Prince Rupert harbor as planned by the G.T.P. engineer. The water front is being laid out to accommodate big ocean liners, ship yards, etc.

Steamer Purchase.—Messrs. J. W. Norcross and R. M. Wolvin, of Toronto, and Winnipeg, respectively, have purchased from the Cleveland-Cliffs Iron Company, the steel steamers Cadillac and Pioneer for trade between the St. Lawrence and upper lakes.

Sarnia.—It is understood that a letter E shaped wharf of substantial proportions is called for in the plans of the Government engineers who have just concluded a survey of Sarnia Bay in connection with the establishment of a mooring harbor here. A Grand Trunk track, it is also stated, will be run out on the backbone of the "E."

Kingston.—On December 11, the steamer Sowards, owned by John F. Sowards, and in command of Captain Shaw, was damaged by fire to the extent of about $1,200, while at Crawford's wharf. Some of the crew were in bed and had to make a hurried exit. The cabin was destroyed, but the hull was undamaged.

St. John, N.B.—The three-masted schooner Wandrian, which was at anchor in the stream on Dec. 10, was run into by the schooner Alma while the latter was being towed down the harbor by the tug Winnie. The vessels were somewhat damaged, the Wandrian's jibboom and part of her headgear being carried away, while the Alma lost some of her rigging.

St. John.—The wind blew 60 miles an hour here December 21, the seas being mountains high. The schooner Ellen M. Golden returned with her rudder braces broken and seams started. The schooner George W. Anderson lost several sails, and the three-masted schooner E. E. Potter returned with cargo shifted. Ocean liners Toko Maru and Saturnia were delayed.

Port Arthur.—The Thunder Bay Contracting Company have been awarded the contract for the construction of the breakwater, extending to the south, and affording protection to the elevators, coal docks and blast furnaces, situated on the south shore of the harbor. Tenders for this work were called for some time ago and that of the local company was accepted, out of a host of competing contractors.

Montreal.—That the sinking of the Cecilia L., the Lake St. Louis steamer, which went down on November 1st, twelve lives being lost, was due to the shifting of the cargo which had not been properly secured, was the decision given on November 28, by Wreck Commissioner H. St. G. Lindsay. In his judgment the commissioner says the boat listed in the gale and even if the cargo had not shifted, would have capsized. No blame is attached to anybody.

Sault Ste. Marie.—The latest development in the perilous trip of the steamer Pickands, of Erie, Pa., which left the Soo on December 4 with the barge Donaldson and C. G. King, bound for Cleveland, occurred at Detroit, December 17, when the marine inspectors pronounced the Pickands unseaworthy and suspended her steamboat license. The unfortunate boat, after twelve days' battle with ice and wind, limped into port with both of her barges waterlogged and her crew exhausted.

Victoria, B.C.—An important announcement in regard to the lights of the Fraser river has just been made by the Department of Marine and Fisheries from Victoria. The Fraser river North Arm and the Fraser river South Curve lights will be changed fom white to a steady red, beginning with January 10, 1913, and thereafter for the remainder of the year. Mariners have complained that a white light is not distinctive enough, and that there are too many other lights along these routes.

Moncton, N.B.—The schooner Ethel B. Sumner was driven ashore near the breakwater at Waterside while seeking shelter from the blinding wind and rain storm, shortly after midnight, Tuesday, December 3. The captain, Wesley Patterson, and three of his crew, were killed, while three others were carried ashore on the wreckage. The dead are, Capt. Patterson, of Shulee, N.S.; Horace Cates, Shulee, N.S.; and Joseph Hopkins, West Sackville, N.B. Those saved were: C. M. Goodwin, West Sackville, N.B.; Arthur Otto Johnson, Cork; and Edwin Breau, of Russia

Montreal.—Announcement was made at the offices of the Harbor Commission on December 23, that James Symons (lieutenant R.N.R.), until recently employed as second officer on board the White Star liner Laurentic, has been appointed assistant harbormaster. The port officials, who will be the principal executive officers of the board, will therefore be: Captain Demers, harbor master; Captain Bourassa, deputy, and Mr. Symons. The last named is now on his way to Montreal, and is expected at the offices of the commission early in the new year.

Halifax.—H.M.C.S. Niobe went to sea on December 11, and remained out for about six hours. Her purpose was to test the new rudder and the engines. The crew of the cruiser is being gradually reduced by sending time-expired men to Great Britain without replacing them. It is probable that at the present time there are not enough men on the Niobe to make a prolonged trip at sea, and it looks as though her crew would be reduced simply to a mark where the ship will be looked after as far as preserving the property is concerned, and with no idea of sea-going.

Sault Ste. Marie.—Clear communication was established recently between the wireless station here and the station at Queen Island, which lies north of Victoria, B.C., a distance of more than 2,000 miles. Operator Walter Gray was at first incredulous, but replied, and was assured that he was talking to Queen Island. This was not a series of disordered dots and dashes, but a clear message. Both operators exchanged congratulations and greetings. Quite recently a message being sent from a vessel in the southern Atlantic to New Orleans was picked up at the Soo.

Victoria, B.C.—One by one the old-time sailing craft are disappearing from the fleet of lumber carriers which did so much to make the Douglas fir famous in the lumber markets of the world. The wind propelled vessels are giving place to those using steam, for the latter not only save time and money in their deliveries, but also provide room for the greatly enhanced cargoes which must now be taken to make a profitable voy-

ago. The old sailing ship Abner Coburn, one of the crack windjammers twenty-five years ago, and which has loaded many times at different British Columbia ports, will soon sail from San Francisco for Puget Sound and may never again be seen under sail. She has been sold, and will be converted into a barge and towed between the Sound and Alaskan points.

Goderich.—The winter fleet here includes the steamers McKinstry, Gordon, Turret Chief, Kaministiquia, Drummond, and McKee.

Collingwood.—The steamer Geraldine, owned by Messrs. Galna & Danter, Parry Sound, which went on the rocks, has been abandoned for the winter and may be a total loss.

Point Edward. — The Inland Lines steamers Empress of Midland and Winona are wintering at Point Edward, and the Kaministiquia of the Western Navigation Co., is at Goderich.

Midland.—The winter fleet at Midland and Tiffin includes the following steamers: Dundee, Westmount, Rosemount, Geo. A. Graham, Neepawah, Emperor, Midland Prince, Midland King.

Halifax.—The Royal George arrived here from Quebec under the command of Captain Thompson, superintendent of the marine service of the Canadian Northern. Mr. Edwin Fair is replacing the first officer, who was disqualified for three months.

Port Arthur. — The Booth steamer [illegible] was ashore at Iroquois Point, near Port Arthur, was released on Friday night, December 13, after having spent thirty-six hours on the rocks The steamer was but slightly damaged, and returned to Port Arthur. The great value of wireless telegraphy was again demonstrated on this occasion, assistance being summoned and rushed to the scene without delay.

Montreal.—The Harbor Commissioners took formal leave of the heads of the various departments on December 9. Major Stephens was presented with a beautiful walking stick by the staff, while the heads of the various departments each received a loving cup from the commissioners. Speeches expressing regret at the severance of all connections were made by the three commissioners and various members of the staff. Major Stephens has sailed for Europe, and will be absent several months.

Owen Sound.—The vessels that will remain in winter quarters in the harbor at Owen Sound include the Dominion Transportation boats, the Manitou and Caribou, which have undergone a thorough overhauling. The City of Meaford will also tie up here for the winter. The Northern Navigation boats will winter as usual at Collingwood. It is hardly likely that the C.P.R. boats will lay up at Owen Sound this winter. The Government steamer "La Canadienne" is in winter quarters here, and several tugs, the Minnie A. Clark, Cynthia, C. Lucas, Sea King and Maud L., are tied up north of Tenth street bridge.

Port Arthur.—The Marconi Wirless telegraph station at Port Arthur is to be replaced by a new one of three times the power and capacity. Work on the new plant has already been commenced under the supervision of Mr. L. S. Hawkins, a Marconi company engineer. All the equipment, including a big new mast, is being put into shape for installation in the spring. The new station will have a radius for communication of between 300 and 400 miles. The next station in the chain to embrace the Great Lakes is at the Soo, a distance of 279 miles from Port Arthur, and it is desired to have a station here that will be able to communicate with the Soo under any conditions. A new main building three times the size of the present one will be built, and the present mast, which rises to a height of 185 feet above the ground, will be moved and another put in its place, so that there will be two masts.

STEAMBOAT INSPECTORS' PAY.

A DEPUTATION representing the steamboat inspectors of the Dominion waited on the Hon. J. D. Hazen, Minister of Marine and Fisheries, on Friday, December 13, and asked for an increase in their remuneration. They were introduced by Mr. C. A. Munson, of West Northumberland, representing Eastern Canada, and George H. Bradbury, Selkirk, representing the West. The two members pointed out the importance of the position held by steamboat inspectors, and the responsibilities which rested upon them. Mr. Bradbury also emphasized the additional cost of living in Western Canada.

The present rate for hull inspector is a minimum of $1,300 and $1,700 as a maximum. For boiler inspector there is a minimum of $1,500 and a maximum of $1,700. They asked that the minimum for hull inspectors be $1,300 and the maximum $2,200, with yearly increases, and the rates for boiler inspectors be $1,500 to $2,200.

Mr. Hazen said that he fully sympathized with the views set forth, but as the estimates had already been prepared for this year, he did not see what could be done at present. He would bear the matter in mind and give it fullest consideration.

CLOSING OF NAVIGATION.

THE Stratheona was the last boat to arrive at Port Arthur before the 1912 season of navigation closed. After her arrival the tugs of the Great Lakes Dredging Co., brought in the lightkeepers from this section of the lake. The tug Whalen, of the above company, arrived here December 12, with the tug Salvor, and the barge Empire from Nipigon Straits, where they were bottled up with ice. The Whalen had to plough through ice eight inches thick to reach them. The steamer Matthews officially closed navigation at Fort William when it left for Cleveland on Friday night, Dec. 13. The steamer was laden with wheat.

GRAVE ABUSES OF DREDGING BY CONTRACT SYSTEM.

A SEVERE condemnation of the system under which dredging contracts have been awarded is contained in the report of the Public Service Commission tabled recently in the Federal House. The report is signed by Messrs. R. S. Lake and G. V. Ducharme.

Grave abuses were found to exist in regard to the letting of dredging contracts. The system permits of the cooking up of tenders, the stifling of competition and the acquisition of enormous profits by contractors. The report recommends that the Government should do the dredging itself, and cut out the private contractors.

Dealing with the question of dredging, the commission stated that changes in the organization of the departmental service are of the highest importance, and that to encourage competition changes should be made in the specification of the tenders. They are convinced that dredging by contract is a very costly system, and that so long as dredging is purely a matter of Government concern it would be more economical for the Government to provide their own plant and do the work themselves.

Respecting the Sorel shipyard, the commission reports grave mismanagement, great waste and the necessity of drastic reforms. The yard has been inefficiently directed for several years, and has not been under a practical shipbuilder. There has been little or no control from headquarters. "The director has submitted too completely to political pressure from candidates or supporters of the Government for the time being. Those working in the shipyard have come to feel that it is a political institution."

The commission recommends that construction work be continued at Sorel under competent management by a practical shipbuilder.

PLANS FOR DAMMING THE ST. LAWRENCE.

THE damming of the St. Lawrence at two points between Montreal and Prescott is proposed in two gigantic power schemes, now before the Borden Government for consideration.

The Long Sault Development Co., the Aluminum Co. of America, the Eastern Canada Power Co., Sir Max Aitken, D. Lorne McGibbon and other eminent Montreal, English and and United States capitalists, are laying plans for the damming of the St. Lawrence above the Long Sault Rapids from the American to the Canadian side, and of developing 800,000 electrical horse power. The second scheme involves the bringing of the level of the St. Lawrence in the vicinity of Coteau, Cedar, Split Rock and Cascade Rapids to the level of the water in Lake St. Francis, thereby providing a head of 85 feet, and the damming of the water from Cascade Point to the Cornwall Canal.

Million Horsepower.

The different islands down the river, for a distance of over fifteen miles, would be connected at retaining dams, and the whole of the rapids division would be eliminated and part of the Soulanges Canal flooded. The electrical energy to be generated is estimated at one million horsepower. This latter scheme is even more gigantic in magnitude than the first.

Two years ago the scheme of the Long Sault Development Co. was rejected by the late Government because of opposition of the Conservative Commission of Canada and big Montreal shipping interests. It also met with strong opposition in the United States.

Monk Granted Charter.

The latter and greater proposition has never been considered by the present government, but a charter was granted to D. Lorne McGibbon by Hon. F. D. Monk early last winter. Just what attitude the Government will now take on the matter it is impossible to say, for Mr. Borden, while leader of the oppostion, strongly opposed the Long Sault Development project, taking the ground that no such huge power monopolies should be permitted, and that the development of Canada's water power should be undertaken for the benefit of the people, and not for private interests.

BLACKSOD BAY HARBOR SCHEME.

IT will be remembered that Premier Borden and colleagues, when in London last July, received an influential deputation upon the question of an all-red route from Britain to Canada and from Canada to New Zealand. The Premier then expressed himself in favor of the proposal, and said his government were giving the matter the utmost consideration. The Canadian Associated Press is officially informed that the promoters in Great Britain have taken an important step towards the accomplishing of the project, and have signed a contract for the construction of a railway and harbor at Blacksod Bay, on the west coast of Ireland. The work will be proceeded with immediately, and is expected to be completed in two years. The harbor will be specially equipped for passenger traffic and for the rapid loading and unloading of vessels of the greatest draught.

C. P. R. GRAIN FIGURES AT FORT WILLIAM.

THAT the Canadian Pacific Railway has handled more car loads of grain in 1912 at Fort William, than ever before, is clearly demonstrated by the following official data received at the C. P. R. headquarters. The figures are also evidence that the company is doing its utmost to prevent congestion at the head of the lakes, and has so far been successful. The returns for the month of November show that 54,314 cars were handled, being a daily average of 1,810. During the corresponding month in 1911, 41,171 cars were handled, or a daily average of 1,405. Unloaded at the elevators were 16,560 cars of grain or an average of 552 daily, as against 12,409 for the same period last year, equal to a daily average of 414.

BRITISH SEAMEN.

A POPULAR delusion that British seamen are decreasing in number is exploded by the returns recently published of the last quinquennial census. Instead of a decline in numbers, there has been a steady rise from 120,412 in 1901, and 128,077 in 1906, to 136,500 last year. The total number of seamen employed on vessels registered in the British Islands (with the exception of sea-going yachts and fishing boats) was 208,214. Further, there has been a conspicuous decrease of foreigners in British registered vessels—a decline of 6,177 in the five years. Irish seamen have also declined in numbers, the most recent figures showing a decrease of 557 in the same period.

Ships, Not Men, Declining.

A decrease in British "sailors," as distinct from British "seamen," has, however, to be recorded; the term "sailors" including able seamen, undefined and ordinary seamen, as distinct from other ratings. This decrease is 279, or 1 per cent. On the other hand, the total demand has been reduced by 4,360, so that the proportion of British sailors remaining is higher than ever.

The passing of the sailing ship is exemplified in a pronounced degree. The latest figures show only 247 vessels of this class engaged in foreign trade. In 1891 there were 2,021. The decline of sailors engaged upon this type of vessel is equally striking, only 2,701 being employed in April, 1911, against 18,666 in April, 1906.

Fewer Foreign Sailors.

The percentage of foreign seamen in home and coasting trades has fallen from 5.9 in 1906 to 5.3 in 1911, and the percentage in foreign trade from 26.1 to 20.3. Of the 18,616 foreigners of stated nationality, 4,891 are Germans, 3,585 Swedes, and 2,131 Norwegians. France contributes but 572.

An analysis of the nationality of the several ratings is interesting. The percentage of Scotchmen amongst the engineers is 21.8, or nearly double that of Englishmen. Wales has the greatest percentage of masters and mates (9.2), and Ireland the largest percentage of able seamen. The Colonies provide most of the firemen and trimmers (34.7 per cent.), and it is here that the foreigners are most strongly represented (26.7 per cent.). In 1906 their percentage was 36.9.

The number of men in trading vessels in April, 1911, from whom seamen and stokers of the Royal Navy Reserve can be recruited, was 14,000 in the sailors' department and 6.000 in the engineers' department.

MONTREAL HARBOR REVENUE.

THE revenue returns received at the Harbor Commissioners' office give a total revenue for the navigation season of $461,396.43 as compared with $430,623.24 for the navigation season of 1911, an increase of $30,773.19. This total has been made up of the following increases: Wharfage inwards, $6,000; wharfage outwards, $5,500, and from local traffic, $19,273.19. There has been a decrease of 26 in the number of sea-going vessels entering the port during the past season compared with the arrivals during 1911. The number for the past season was 736, as against 762 for the navigation season of 1911, but there has been an increase in tonnage, the figures being 2,403,924 tons for 1912, as compared with 2,338,252 tons for 1911, an increase of 65,672 tons.

Mr. C. C. Ballantyne recently addressed the Toronto Canadian Club on the history and development of the port and harbor of Montreal.

CANADA'S MERCHANT MARINE.

IN the calendar year 1911, there were built and registered in Canada 339 vessels, measuring 27,736 tons. During the year, 279 vessels were removed from the Dominion shipping register for various causes, and there were left on the books at the close of the year, 8,088 vessels of 770,446 tons. Of the total, 3,444 were steamers measuring 588,741 tons gross. The estimated value of all the vessels registered is $23,113,380. Roughly, 41,500 persons find employment in connection with the industry. Of the 142 registered steamships of 1,000 tons or over, a large proportion is engaged in the St. Lawrence and the Great Lakes traffic. The Emperor heads the list in size with 7,031 tons gross register; the E. B. Osler coming next, with 6,787 tons gross. There are quite a number of 4,000 tons gross or over.

Previously the standing of the Provinces, according to the net tonnage of both sailing and steam vessels, was:—Ontario, 236,877 tons; Quebec, 193,682 tons; Nova Scotia, 142,631 tons; British Columbia, 122,264 tons; New Brunswick, 55,872 tons; Prince Edward Island, 9,683 tons; Manitoba, 6,373 tons; Yukon, 2,708 tons, and Saskatchewan, 356 tons. The high standing of British Columbia is due partly to the fact that many of the ships of the Canadian Pacific fleet are registered there. Thus, Vancouver is fourth in the list of shipowning ports in Canada, with 45,573 tons to its credit, Victoria being second, with 65,350 tons; Toronto is third, with 57,513 tons, first place being held by Montreal with 145,274 tons.

ADVANCE OF THE STEAM TURBINE.

THE report of Parsons Marine Steam Turbine Co. states that the Government of the Commonwealth of Australia has taken a license for the manufacture of Parsons turbines there. The application of geared turbines to marine propulsion, on the system initiated by the company, has made great progress. No less than 15 vessels of various types, with an aggregate of over 100,000 horsepower, are now built or building, equipped with geared turbines. The "combination" system, in which reciprocating engines are associated with low-pressure turbines, continues to find favor in certain classes of passenger steamships.

In the application of turbines in foreign countries, several of the vessels have now completed trials and given great satisfaction. The most important of these are a German battle cruiser and battleships for Austria, Italy, and the United States, as well as several smaller naval vessels in other countries. Turbines are at present being constructed for naval ships for the following countries:—Argentina, Austria, Belgium, Chile, Denmark, France, Germany, Italy, Japan, Portugal, Russia, Spain, Sweden, Turkey and the United States, and there are prospects of the largely-extended use of Parsons turbines for ships still to be laid down in many of these countries.

The total horse-power completed and under construction in the works of the company and of licensees, as well as in the works of the continental sub-companies and of licensees of Parsons' Foreign Patents Co., amounts to about 8,500,000 h.p., an increase during the year of about 2,100,000 h.p. Of this total horse-power, nearly 7,200,000 h.p. are, or will be, employed for the propulsion of warships, and over 1,300,000 h.p. in vessels of the mercantile marine and yachts. At present the total number of vessels built and building for the Royal Navy and the Colonies with Parsons turbines is 202; the total horse-power being about 3,700,000.

FUELS FOR INTERNAL COMBUSTION ENGINES.

IN an article on "Fuels for Internal Combustion Engines," by Engineer-Commander A. E. Tomkins, it is stated that a compression up to 220 lb. per square inch can be used for benzol without premature ignition, and, consequently, a slightly higher thermal efficiency is possible than with petroleum spirit, with which a compression of 90 lb. is the usual practical limit. By substituting benzol for petroleum spirit in the ordinary petrol engine, almost all four-stroke cycle engines can be worked at half the existing cost of fuel, but for small engines a special carburetter is required.

Under working conditions, benzol vapor requires 36 to 50 times its volume of air for good combustion, as compared with petrol vapor, which requires 45 to 80 volumes; the carburetter must thus be adjusted to the different proportion to obtain good combustion. Further, the clearance space should be less in proportion, so as to obtain a greater compression, and, therefore, a higher temperature to completely burn the benzol. The greatest objection to benzol as fuel is the price, which, outside very small limits of output as a by-product, would probably become absolutely prohibitive. This point is appreciated when it is remembered that 100 tons of coal yield only 1,000 gallons of tar, which, in its turn, produces only six gallons of benzol. As a by-product in the production of illuminating gas, benzol may be purchased at 12 cents per gallon, but it is easy to see that such a price can only obtain in the absence of any even moderately great demand.

WRECK COMMISSIONER'S FINDING RE "ROYAL GEORGE."

CAPTAIN James Harrison, Chief Officer D. L. Edwards, and Samuel Rioux, pilot of the Royal George, have all been suspended as a result of the enquiry into the grounding of the Royal George below Quebec. Commander Lindsay, Wreck Commissioner, in announcing the decision of the Court, said: "After carefully considering the evidence, some of which was of a contradictory nature, the Court is unanimous in its opinion that the stranding was due to the overconfidence of the pilot, Samuel Rioux, and the reckless navigation which he conducted. He did not show the necessary prudence and precaution which should have been shown in this case." The judgment goes on to say that the pilot had an indefinite idea of the position of the ship. The Court has, therefore, decided to suspend his license for three years.

The report considers that Captain James Harrison should have been on the bridge at the time, and had he been there the accident would probably have been avoided. His certificate is suspended for twelve calendar months.

The Court also held that the Chief Officer, D. L. Edwards, who was on the bridge at the time, should have called Captain Harrison because of the condition of the weather. They, therefore, considered that he was not prudent, and his certificate is suspended for three months.

TWO NEW C.P.R. LINERS.

THE C.P.R. will have two additional boats on the Montreal-Liverpool route in 1904, Mr. G. M. Bosworth, Vice-President of the Canadian Pacific Railway, stated recently that the corporation's fleet would be added to by two new ships, which will be expressly built for the Montreal-Liverpool service. He negotiated for the ships on his recent visit to England, but the orders were not placed until he made his report to the directors of the company.

"The design," he says, "has met with approval, and an order for the two 12,000-ton boats is now in the hands of Barclay, Curle & Company, one of the leading shipbuilding concerns of Glasgow. They will be the new cruiser type lately adopted by the company, and the maiden trips will be made in June and July of 1914."

These boats are to be a combination passenger and freight type, carrying 530 second-class passengers and 1,230 third-class, and will make 16 knots. Each will have an over-all length of 520 feet.

SCOTTISH SHIPBUILDING.

DURING the month of November, Scottish shipbuilders launched 40 vessels of 71,658 tons. Of these 29 vessels of 68,488 tons were built on the Clyde, four of 1,705 tons on the Forth, and seven of 1,465 tons at Aberdeen and Moray Firth ports. The Clyde tonnage for November is the second in size among the monthly tonnages of this year, and it is the highest on record for the month of November. The Clyde output for the eleven months consisted of 258 vessels of 588,806 tons, which is easily the highest yet attained, and is short of the total for 1911—the highest for a year—by only about 42,000 tons. The output has risen, within less than three years, from 392,392 tons to what promises to be considerably over 600,000. This is the sharpest and best maintained advance in the history of the river, and it is the more satisfactory in that it has been based on a steady demand for general trading steamers for service in all parts of the world.

With regard to the prospects, were it not for the possibility of labor trouble, it would be quite safe to predict that the trade will be as good in 1913 as 1912. There is an enormous amount of work in the Scottish yards, particularly in those of the Clyde. The orders booked have kept pace very well with the tonnage completed, and all through the year there has always been a keel to lay down on each vacated slip. In November the list of new contracts was particularly satisfactory, and included the two British battleships for Fairfield and Clydebank respectively, an Anchor liner for Linthouse. a Cunard liner for Greenock, a Clan liner each for Linthouse and Scotstoun, and a number of oil-tank and general cargo steamers. These vessels, and many others, should all reach the launching stage before the end of next year, while the battleship Benbow, and the Cunard liner Aquitania will probably be launched in March, so that the tonnage for the year is certain to be very large.

MONTREAL HARBOR BOARD.

THE formal order in council appointing as Montreal Harbor Commissioners, Messrs. W. G. Ross, Farquhar Robertson and Lieut.-Colonel A. E. Labelle, was passed at the afternoon sitting of the Cabinet, December 24. Mr. Ross will be chairman. The new commission will assume office on January 1.

Mr. W. G. Ross enjoys the distinction of being one of Canada's most prominent and best known business men. He is a Montrealer by birth and has always resided in that city. His business career has been a bright one, and as managing director of the Montreal Street Railway from 1905 to 1911, he did much to make that one of the strongest of Canadian corporations. At the present, Mr. Ross holds the following offices:—President of the Asbestos Corporation of Canada, director of the Dominion Steel Corporation, the Quebec Railway, Montreal Light, Heat and Power Co.; also many other official connections with noted Canadian corporations.

Mr. Farquhar Robertson, coal merchant, hails from Glengarry County, Ontario, having devoted several years of his life to farming in that district. His first step into commercialism was made when he became manager of a Montreal lumber concern. He started his coal business in 1879. Mr. Robertson is a director of the Montreal Transportation Co., the Prudential Trust Co., and was president of the Montreal Board of Trade in 1909, having been vice-president the year before. He is prominently identified with charitable undertakings, and was three times elected by acclamation to represent St. Andrew's ward in the City Council.

Lieut.-Colonel Alfred E. Labelle was born in Montreal, and has been for more than a quarter of a century one of Canada's most prominent grain merchants. In company with Sir Rodolphe Forget, George A Grier and Thomas Williamson, he organized the St. Lawrence Flour Mills Company, of which he was chosen managing director. He is the president of the Chambre de Commerce and is prominently identified with the Canadian militia.

EMPRESS OF ASIA LAUNCHED.

THE second C.P.R. steamer for the Pacific route was launched on Saturday, November 30, from the yards of the Fairfield shipbuilding Company, Glasgow. She is named the Empress of Asia, her sister ship launched some three months ago being the Empress of Russia. The Empress of Asia left the slip without a single check and with such rapidity that Mrs. G. M. Bosworth, wife of the vice-president of the C.P.R., did not have time to break the bottle of wine against her bows, and it was through the agility of one of the employees of the Fairfield Company this was accomplished.

TO DEVELOP HAMILTON HARBOR.

THE Richelieu and Ontario Navigation Co., which controls nearly the whole of Canadian lake and passenger transportation business, will spend next year one million dollars in improving its extensive frontage east and west of James Street on the bay front. It also expects to co-operate with other lake lines and persuade either the harbor commission or the railways operating in connection with lake cargo traffic to build a common railway spur along the bay front whereby cars could be loaded direct from boats at the wharves, thus saving thousands of dollars a year to each company in cartage charges. This spur and its various switches along the wharves could be utilized in hauling local carloads as well as goods for transhipment overland to points near this port. The information became known recently, following an interview in City Engineer Macallum's office between that official and James Playfair, head of the Northern Navigation Co., a strong link in the R. and O.

UNWATCHED LIGHT AT AUX SABLES, LAKE HURON.

AN unwatched flashing red, acetylene light of 130 candle-power, showing one flash every three seconds (flash 0.3 second, eclipsed 2.7 seconds), is established at Aux Sables Pierhead light station, western shore of Lake Huron. The light will be exhibited 34 feet above the water from a white, pyramidal, skeleton steel tower, surmounting a white tank house on a square concrete base rising eight feet above the water, located on the northern breakwater in front of the present frame tower, which will be removed. The fixed red light heretofore shown will be discontinued

ICE BREAKERS ON THE LAKES.

ARRANGEMENTS are being completed by the Government to have ice breakers keep the harbors of Fort William and Port Arthur open until January 20, in order that the vessels which are wintering there may be able to move from dock to dock to take on grain. W. J. Carson, of the Marine Department, is already at the head of the lakes to look after the work, and to give every assistance from a marine standpoint in facilitating the grain movement.

Thanks to the effort of the Government, despite the enormous crop, the grain is moving this season with less complaint than for years. There has been no car blockade, and so far no congestion at the head of the lakes such as upset business conditions in the West last winter.

The tugs Scheck and Swabin acted as ice-breakers at Sault Ste. Marie, and kept the St. Mary's river open until navigation closed. The tugs are owned by the Great Lakes Towing Co., and cost the Government $300 a day.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals who Have Been More or Less Prominent in the Marine Sphere

Mr. Andrew Dick, who has been keeper of the Point Pelee lighthouse for thirty years, has been granted superannuation and will be presented with an Imperial Service Medal.

J. Bruce Ismay has virtually withdrawn from his position as managing director of the White Star line. Mr. Ismay has not been in Liverpool for several weeks. Harold Sanderson is now in control of the company.

Joseph D. Evans, who has been chief engineer of the Montreal Tramways Co. since June, 1911, severed his connection with that company on January 1, and became construction manager of the Electric Bond & Share Company, of New York, one of the largest builders and operators of public utilities on the continent.

Mr. Wm. L. Beatty, one of Welland's prominent and highly respected business men, died recently, aged seventy-one years. He was the senior member of the well-known firm of M. Beatty & Son, Welland Iron Works. This, one of Welland's most prosperous industries, has been carried on by the Beatty firm for upwards of half a century. He had been in ill health for some time.

Mr. William A. Kernaghan, president of the New Orleans Harbor Board, and Mr. Thos. J. Kelly, a member of that board, were in Montreal on November 29, and were entertained by the Montreal Harbor Commissioners aboard the tug Sir Hugh Allan. They are touring North America, and visiting all the harbors on the continent with a view to becoming conversant with modern harbor equipments and adapting them for use in the ports of their city.

Mr. John F. Pierce has been appointed district passenger agent of the Richelieu & Ontario Navigation Co., for the New England States and Maritime Provinces, with headquarters at Boston. The appointment was announced on December 13 in Montreal, to take effect immediately. Mr. Pierce was for ten years chief clerk in the traffic department at Montreal, and during the last two years he has acted in the capacity of traveling passenger agent in the territory in which his present appointment becomes effective.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont., Captain M . McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclavia Street, Kingston, Ont.; Captain T. J. Murphy, 111 William St., Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy St., Kingston, Ont.; Captain James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rideau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.

President—James Playfair, Midland; Counsel—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.

Chairman—W. F. Wasley, Gravenhurst, Ont.
Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.

President—A. A. Heard, Albany, N.Y.
Secretary—M. R. Nelson, New York. .. ....

THE SHIPPING FEDERATION OF CANADA

President—A. A. Allan, Montreal; Manager and Secretary—T. Robb, 526 Board of Trade, Montreal.

SHIP MASTERS' ASSOCIATION OF CANADA.

Grand Master—Capt. J. H. McMaugh, Toronto, Ont.; Grand Secretary-Treasurer—Capt. H. O. Jackson, 376 Huron St., Toronto.

GRAND COUNCIL, N.A.M.E. GRAND OFFICERS.

James T. McKee, 268 Douglas Avenue, St. John, N.B., Grand President.
Thos. Theriault, Levis, P.Q., Grand Vice-President.
Neil J. Morrison, P.O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
Jno. A. Murphy, Midland, Ont., Grand Conductor.
George Bourret, Sorel, P. Q., Grand Doorkeeper.
Richard McLaren, Owen Sound, Ont.
L. B. Cronk, Windsor, Ont.
Grand Auditors.

SARNIA AS WINTER HARBOR.

THAT Sarnia will have a winter harbor seems to be fairly certain. Messrs. Carlisle and Craig, of the Public Works Department, Ottawa, have been there, making a survey of Sarnia Bay, which is the proposed site. The engineers were engaged for several days, and soundings were made along both shores of the bay. It is understood that the plan proposed will include provision for piers which will give ample public wharf room to accommodate steamers. The Department at Ottawa has written asking if the town will supply water mains, water for fire protection and free lights. Mariners all over the lakes have given the harbor proposition their hearty endorsement, as a shelter basin at this port would benefit navigation almost more than it would benefit Sarnia.

FURNESS LINER WRECKED.

THE Furness liner Florence, was wrecked Friday, Dec 20, on the ledges of St. Shott's, near Cape Race, and twenty-two of her complement of 27, including the captain, were drowned. Five members of the crew, including the second mate, reached land in a boat and brought the news to Trepassey, near St. John's, Nfld. There appears to have been no passengers on the ship.

The Florence was of 1,609 tons burden and was built in Sunderland, England in 1889. She was 293.5 feet long, 40.2 feet beam, with a depth of 26.1 feet.

Directory of Subordinate Councils for 1912.

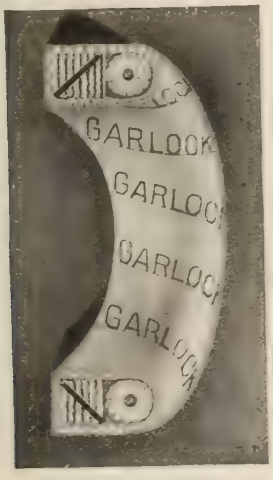
Name	No.	President.	Address.	Secretary.	Address.
Toronto.	1	A. J. Fisher,	490 Concord Ave.	E. A. Prince,	61 Elm Grove, Toronto.
St. John.	2	J. F. Matthews,	50 Douglas Ave.,	G. T. G. Blewett,	65 Harrison St., St. John, N.B.
Collingwood.	3	Andrew Kerr,	Box 343, Collingwood,	Robert McQuade,	P.O. Box 97, Collingwood,
Kingston.	4	A. E. Kennedy,	395 Johnston Street,	James Gillie,	101 Clergy St., Kingston, Ont.
Montreal.	5	A. F. Hamelin,	3208 Le Tang Street,	O. L. Marchand,	St. Vincent de Paul, P.Q.
Victoria.	6	Alex McNivern,	P. O. Box 234,	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver.	7	A. S. DeGruchy,	Room 23, Williams Bldg.,	E. Read,	859 Thurlow St.
Levis.	8	Helaire Mercier,	Bienville, Levis,	Jules Lecours,	Bienville, Levis, P.Q.
Sorel.	9	Geo. Bourret,	Sorel, P.Q.,	Al. Charbonneau,	P.O. Box 132, Sorel, P.Q.
Owen Sound.	10	H. W. Fletcher,	636 4th Ave. East,	E. J. Riley,	1030 1st Ave., Owen Sound, Ont.
Windsor.	11	Alex. McDonald,	Windsor, Ont.,	Neil Maitland,	221 London St. W., Windsor, Ont.
Midland.	12	Jos. Silverthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
Halifax.	13	D. J. Murray,	Victoria Rd., Dartmouth,	Chas. E. Pearce,	Portland Street, Dartmouth, N.S.
Sault S. Marie.	14	Thos. O'Reilly,	Sault Ste Marie,	Geo. S. Biggar,	Sault Ste Marie, Ont.
Charlottetown.	15	J. K. Sutherland.	Charlottetown, P.E.I..	Lem Winchester.	302 Fitzroy St., Charlottet'n, P.E.I.

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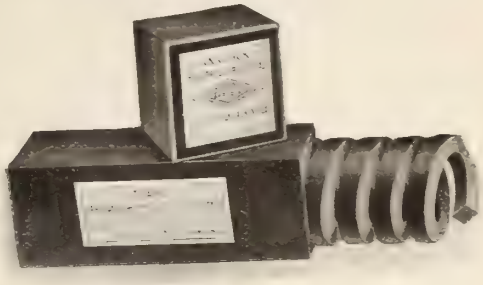
The Garlock Packing Co.

Hamilton

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BRANCHES:

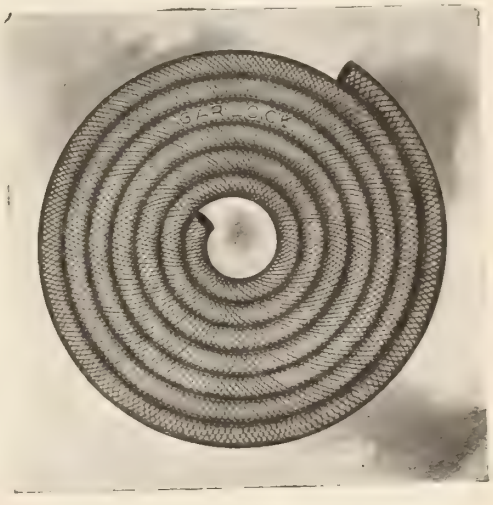
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Garlock High Pressure Spiral



Garlock Low Pressure Diagonal



Garlock Gum Gore

RICHES IN SHIPS.

"SHIPOWNERS are simply coining money," said a prominent London shipping authority recently. He drew attention to the Black Sea rates (the price per ton of cargo from the Black Sea home), which were quoted recently at $4.81 a ton, as against $1.31 three years ago. "With such exceptional rates prevailing, not only to and from the Black Sea, but throughout the world," he said, "the earning value of ships has increased tremendously, and so naturally has their purchase value. I have just sold, at a net profit of $35,000, a vessel which I purchased five years ago. When such exceptional prices can be obtained for ships, it follows that many shipowners, fearing a collapse sooner or later, are selling steamers which they do not want, thus increasing their year's takings.

"Within recent years, the owner of a tramp steamer of 7,000 tons deemed himself fortunate if he cleared a net profit of $5,000 a year. At present rates the same steamer can clear $35,000 in a ninety days' voyage to and from the Black Sea, or $140,000 a year. Placing the cost of the steamer at $200,000, this gives an income of over 50 per cent. of her value. The owner of a fleet of ten ships should be making his $1,000,000 a year, and the large company, with its twenty or thirty steamers, a small fortune."

NEW FLOATING DRY AND COALING DOCK.

MONTREAL capitalists, including several of the promoters of the Kingston (Jamaica) Street Railway, are behind a project known as the Port Royal Floating Dry and Coaling Docks, Limited. It is the intention of the company to furnish coal to ships using the Panama Canal, which will pass by Port Royal both ways. As a matter of fact, a steamer coming from Liverpool or New York and going to the Far East or Pacific ports makes the first call for coal at Kingston and her last on the return voyage. It is 5,000 miles to Liverpool, 4,000 to Gibraltar, 1,600 to New York, and from Kingston to Colon at the mouth of the canal the distance is but 580 miles.

The intention of this company is to build a first class floating dock in England and then tow it to Jamaica, meantime building the coaling station and workshops on land donated by the government. The government besides giving a thirty years exclusive franchise, and the valuable site, will admit all the materials and dock duty free. The cost of the enterprise is estimated at $2,000,000, and it is understood that a year will be required to build the dry-dock and local works.

THE MID-SCOTLAND CANAL.

A STRONG plea for the Mid-Scotland Ship Canal is made in the new "National Review" by Commander Currey. To him it seems amazing that no administration has taken up the project. What in these days, he asks, is a trifle like $60,000,000? He grants that the canal is neither spectacular nor exciting, and that it is open to be described as promoted by Scotsmen for the benefit of Scotland. Of course it would benefit Scotland, but he submits that the strategical gain to the United Kingdom must immensely outweigh the commercial gain. If, however, we cannot make up our minds to spend $60,000,000 on a ship canal he can discover no reason against spending $2,500,000 in making the existing barge canal useful for submarines and destroyers.

CANADA'S NAVY IN ILL-FAVOR.

A Portsmouth, England, correspondent says pensioners and fleet reserve men are fighting shy of offers to join the Canadian navy, and asserts that the real cause of the trouble is that Canada is trying to start a navy without proper preparations for the men's training and accommodation.

The Evening News of November 19, gives these assertions considerable prominence. The correspondent says that men who went out in the Niobe and Rainbow were picked men, hoping to fill the position of instructors. They found nothing ready for them, and the recruits who presented themselves in the belief that they would receive training on a man-of-war, found themselves limited to an old fishing schooner.

The Canadian recruits' dissatisfaction has reached the ears of British sailors, who consequently regard the Canadian navy extremely suspiciously.

THE AQUITANIA.

IT has been provisionally arranged that the new Cunard steamer Aquitania, which, as is well known, will be the largest, or one of the two largest, vessels in the world, shall be launched by Messrs. John Brown & Co. next March. How her dimensions compare with those of the Hamburg-American liner Imperator, which was launched last May at Hamburg by the Vulcan Company, is not yet authoritatively known, but it is understood that the difference between the two vessels is not very great, considering their immense size. Each will be over 50,000 tons gross.

The Aquitania will be completed within about ten months after the launch, and she is expected to go down the river from Clydebank in February, 1914, by which time the navigable channel in the lower reaches will have been widened and deepened by the Clyde Lighthouses Trust, so that the vessel may be taken safely to sea. In order to carry out the necessary operations, a powerful dredger is being built for the trustees at Port Glasgow, which will be delivered about the time the Aquitania is launched, and will be set to work immediately at the points where the navigation of the waterway is most difficult. In anticipation of the launch, the Clyde Navigation Trustees are improving the channel within their jurisdiction further up the river.

There seems to be still some doubt regarding the methods which will be adopted ultimately in order to reduce the rolling of the vessel. At first bilge keels were included in the design, and these were actually made and fitted, but not riveted, on the vessel. Since the proposal was made that Frahm anti-rolling tanks should be used, it has been decided to dispense with bilge keels, as both devices should not be necessary, and accordingly the keels have been removed. It is understood, however, that they will be kept, so that they may be fitted at any time if they are found to be necessary.

NAVAL ENGINEERING ON THE CLYDE.

The decline of the Thames as a marine engineering centre and the rise of the Clyde is brought out in the following table, in which the dates are those of the launch of ships:—

Ships engined by	1893-7	1898-'02	1903-7	1908-12
Thames firms	5	9	9	1
Clyde firms	2	11	11	10
Vickers, Barrow...	1	4	4	4
Tyne firms	1	6	8	7
Laird, Barrow ...	1	3	0	2
Harland & Wolff.	1	1	3	1
Earle's Co., Hull.	0	2	0	0

Of the horse-power for armoured ships launched in the last five years including the five ships of the 1911 programme, the Clyde has supplied 431,500, the Tyne 198,500, Vickers 197,500, Laird 64,000, the Thames 27,000, and Harland and Wolff 25,000. Of the 72 destroyers launched between 1898 and 1907, only 8 were built on the Clyde, while of the 106 launched or ordered since, that river has secured orders in no fewer than 49 instances. Of the twenty 1912 destroyers twelve are being built on the Clyde.

Sault Ste. Marie.—The steamer Rochester, of the Western Transit Line, which struck a reef at Whitefish Point, Lake Superior, and for 24 hours was exposed to a dangerous north-east gale, released herself, and proceeded on her way to Duluth.

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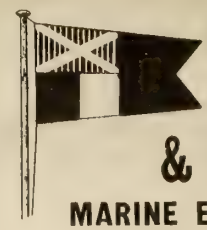
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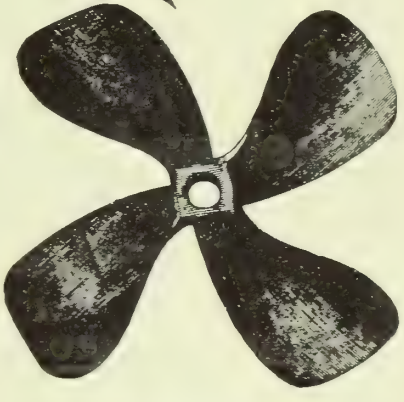
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